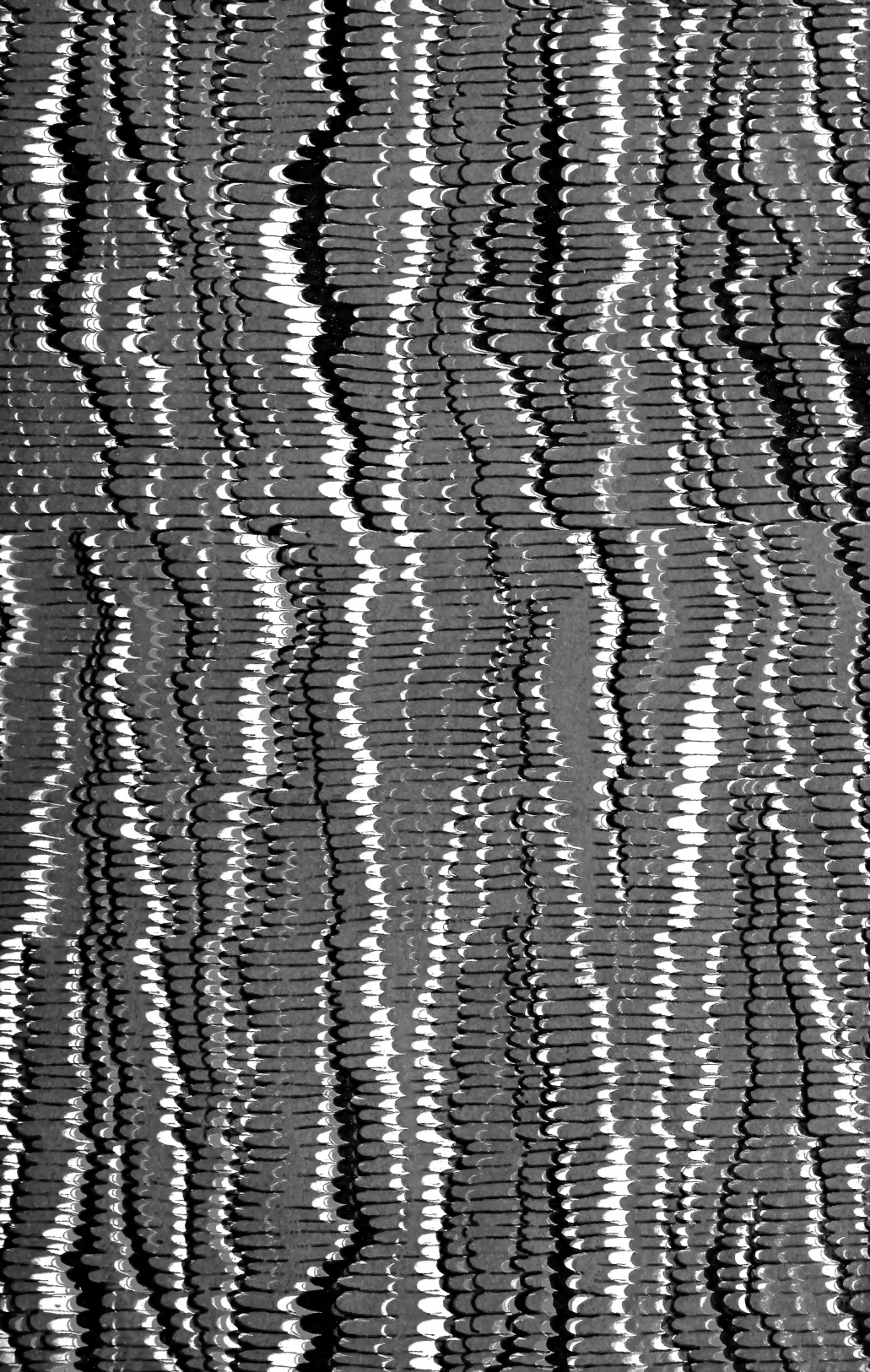




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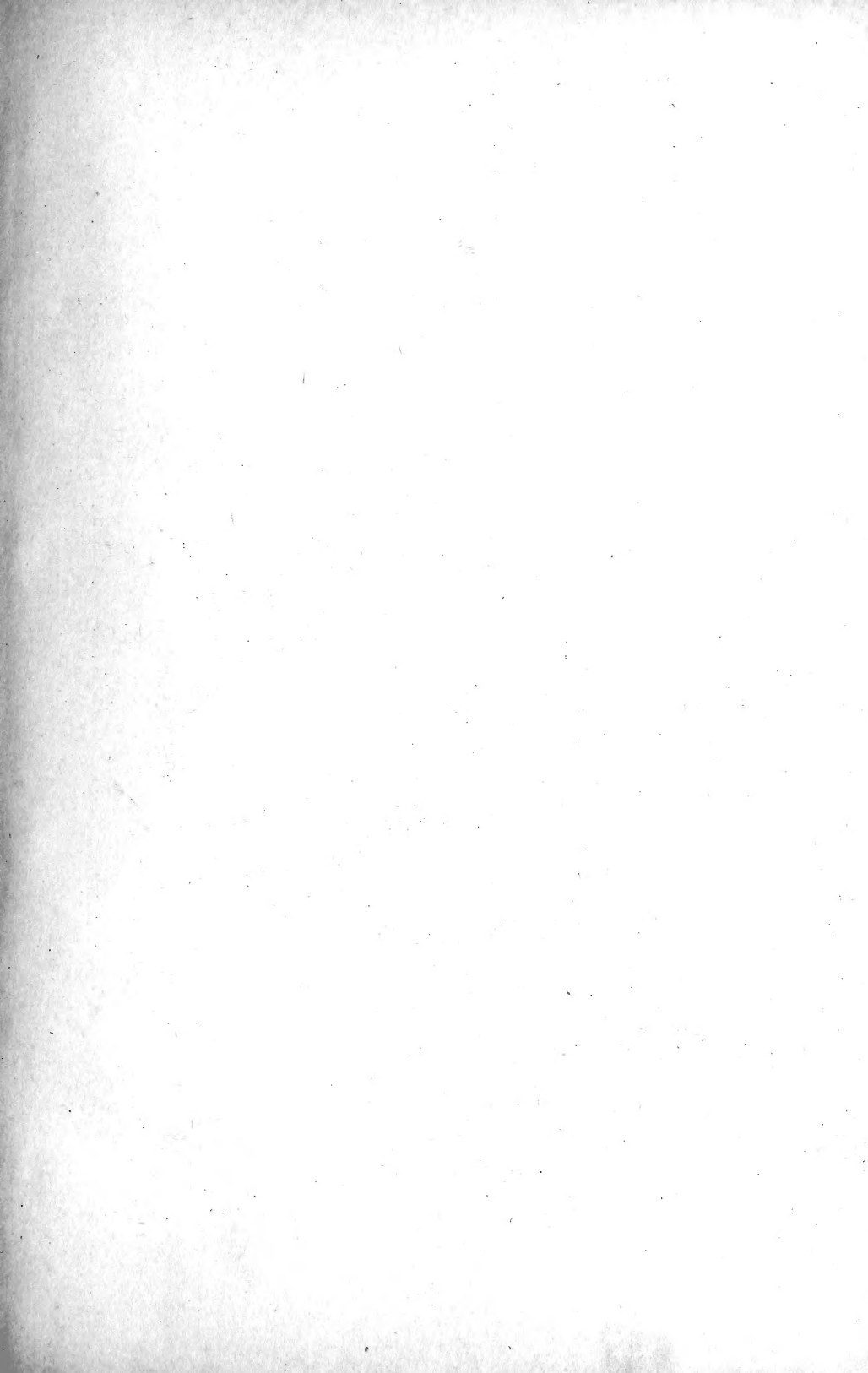
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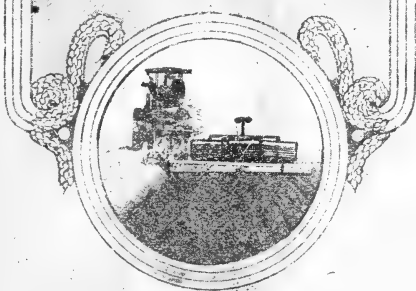
of the

Ninth International Dry-Farming Congress

3 AUG 1914

Held at
Wichita, Kansas, U. S. A.
October 12-15
1914

THE
INTER-
NATIONAL
DRY-
FARMING
CONGRESS



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 Mexico—N. P. Escobar, Juarez.
 Rumania—D. I. Andronescu, Urbana, Illinois.
 Russia—William P. Anderson, Saint Louis, Missouri.
 Spain—Gregorio Cruz Valero, Madrid.
 Turkey—Izzet B. Suryieh, Urbana, Illinois.
 Union of South Africa—Colonel A. J. Bester, Colesburg, Transvaal.

THE OFFICIAL PROCEEDINGS

This is the Official Proceedings of the Ninth International Dry-Farming Congress, held at Wichita, Kansas, U. S. A., October 12-15, 1914.

This volume contains a verbatim report of the proceedings of the Congress; a number of papers which were read in the unavoidable absence of those who were to deliver addresses; and an account of the business of the Congress for the past year.

Also there is printed, in the close of the volume, the constitution as it stands today, having been amended at the Wichita Congress.

Attention is called to two excellent definitions and dissertations on the Congress, its work, its field, etc.

The addresses at the Ninth Congress were easily the most practical and interesting ever delivered at any public-welfare or useful gathering; and they will not fail to be of inestimable value, not only to the scientist, the research man, and the practical farmer, but to officials, businessmen, and ordinary laymen; for there is no useful citizen today who is not vitally interested in the progress of agricultural development.

THE INTERNATIONAL DRY-FARMING CONGRESS

The International Dry-Farming Congress represents something tangible and practical.

It has a mission.

Its research work is of the utmost value to agricultural progress.

Its teachings have cheered countless men and women on semiarid farms, and enabled them to win the battle for homes.

It has stimulated agriculture wherever the rainfall is light or irregular.

It can point to definite results it has accomplished, in every section of the West; while the general good of its work is universally recognized.

It is the clearinghouse for progressive ideas and useful facts gleaned from the experience of actual farmers; and for the widely-scattered experiment stations.

Its annual sessions and expositions are of the greatest possible value to all those whose problem is to catch and to conserve moisture.

It is easily the foremost agricultural organization in the world.

A LIST OF THE CONGRESSES

FIRST—Denver, Colorado.

January 24-26 inclusive, 1907.

Call issued by Governor Jesse F. McDonald.

SECOND—Salt Lake City, Utah.

January 22-25 inclusive, 1908.

President—Fisher Harris, Utah.

THIRD—Cheyenne, Wyoming.

January 23-25 inclusive, 1909.

President—Governor B. B. Brooks, Wyoming.

FOURTH—Billings, Montana.

October 26-28 inclusive, 1909.

President—Governor Edwin L. Norris, Montana.

FIFTH—Spokane, Washington.

October 3-6 inclusive, 1910.

President—Frank W. Mondell, Wyoming.

SIXTH—Colorado Springs, Colorado.

October 16-20 inclusive, 1911.

President—J. H. Worst, North Dakota.

SEVENTH—Lethbridge, Alberta, Canada.

October 19-26 inclusive, 1912.

President—John A. Widtsoe, Utah.

EIGHTH—Tulsa, Oklahoma.

October 22-November 1 inclusive, 1913.

President—W. R. Motherwell, Saskatchewan, Canada.

NINTH—Wichita, Kansas.

October 12-15 inclusive, 1914.

President—H. J. Waters, Kansas.

PROCEEDINGS
OF THE
Ninth Annual Sessions
OF THE
International Dry-Farming Congress
HELD AT
Wichita, Kansas, October 12-15, 1914

Note: All sessions but one were held in the Banquet Room of the Scottish Rite Cathedral. One session, Tuesday afternoon, October 13, a continuation of the Livestock session, was held at the Livestock Exchange, Wichita Union Stockyards.

FIRST SESSION

MONDAY MORNING, OCTOBER 12

The Congress was called to order by W. I. Drummond, Muskogee, Oklahoma, Chairman of the Board of Governors.

CHAIRMAN DRUMMOND:

The Ninth Annual Sessions of the International Dry-Farming Congress are now convened.

We shall arise and attend the Reverend Doctor Andrew Melrose Brodie, pastor of the First Presbyterian Church of Wichita, in his invocation.

DOCTOR BRODIE:

O God, Thou art our Creator, our Father, our Friend, and we thank Thee that Thou dost so love us as not only to give us our being but to provide all that is necessary for sustaining life. We thank Thee, O God, that Thou dost call us to be collaborators with Thyself. Whilst Thou hast created the earth and all that is therein, Thou dost call men to share with Thee in bringing forth the products of the earth that every man and woman may go back very much wiser than when they came and that the knowledge gained may be shared that others may bring forth more abundantly of the fruits of the earth that there may be an abundance for all classes and conditions of people and that we may rejoice in our resources. Bless all the speakers here, for they come to tell us the wonders of the earth and grant that the time may soon come when men shall not use the weapons of warfare any more but shall give themselves to collaborating with Thee. Give us

your blessing and hear us as we unite in the prayer our Jesus has taught us. Our Father Who art in Heaven, hallowed be Thy name, Thy kingdom come, Thy will be done on earth as it is in Heaven. Give us this day our daily bread, and forgive us our debts as we forgive our debtors. Lead us not into temptation but deliver us from evil, for Thine is the Kingdom and the Power and the Glory forever. Amen.

CHAIRMAN DRUMMOND:

The constitution of the International Dry-Farming Congress provides for the organization of a Board of Control composed of citizens of the state in which the Congress and Exposition are held. The success of the Exposition, and of the Congress itself, depends in a great measure upon the work of this Board of Control.

This Board has charge of the very important work of organizing the various states, counties and countries for Exposition and representation purposes, and is responsible to the Congress for the financial obligations incident to the securing of the Congress.

We have been extremely fortunate this year in that the Board of Control has been formed from the ranks of the very best and most progressive business men in the city of Wichita and the entire state of Kansas. It is indeed a pleasure to state that this Congress has at all times had the benefit of the assistance and counsel of these splendid men. Every obligation has been faithfully kept; and Kansas and Wichita, through this Board of Control, have more than done their part.

I now have the honor and pleasuring of introducing to you, Charles W. Southward, Chairman of the Kansas Board of Control.

CHAIRMAN SOUTHWARD:

This is an epoch in the history of Kansas and of Wichita.

The convening of this Congress and the assured success of the great International Soil-Products Exposition held with it, form the most prominent agricultural event in the state in its history.

Kansas is an agricultural state, and Wichita is in the center of an agricultural section. Kansas is also an industrial state, and Wichita is an industrial and distributing city, but the fullness of agricultural development means greater states and greater cities, and Kansas and Wichita have not lost sight of this fundamental principle.

It is a pleasure to the Kansas Board of Control and its officers to have worked during the past year with the Congress and its officials. The distinguished position which President Waters occupies, and his charm as an associate; the earnestness and intelligence of Dean Jardine; the honest attention to the business affairs of the Congress given by Chairman Drummond and the Board of Governors; and the diligence of the office maintained in this city throughout the year by the Congress, have impressed the officers and members of the Kansas Board of Control with the great cause in which the Congress is working and the effectiveness with which it performs that work.

Now that we lay down our responsibility, we feel we have discharged our duty at least reasonably well.

It is customary on these occasions to have some fitting words of welcome from officials and I am now going to introduce to you one who will speak to you of the state of Kansas and speak to you well. I have the honor to introduce the Governor of Kansas, George H. Hodges.

GOVERNOR HODGES:

Mr. Chairman, Mr. President, Doctor Waters and Members of this Congress here assembled: I am gratified to be here this morning and as executive of this great commonwealth of ours, welcome you delegates to the greatest Congress of the world. Agriculture is the greatest industry of mankind, and you men and women here this morning from foreign lands and from our own home land, we are pleased to be with you and to talk to you just a few moments. We feel assured that great good will come out of our coming and that we will all go home with renewed energy given to cultivating the soil in a scientific manner.

We are proud of Kansas and it is peculiarly and particularly fitting that this great Agricultural Congress should meet in this queen city of Kansas and in the greatest agricultural district of the world. (Applause). We boast of our natural resources, we boast of our livestock, we are proud of the citizenship and we are proud of the spirit that makes Kansas great. We wish, in Kansas, with our 85,000 square miles, to have more men come to us—men of genius who wave a magic wand and transform our land. We are proud of our dormant natural resources, but better than that, we have the great agricultural interests of our state that mean more to us than any and all other activities combined.

Great good will come out of this Congress. Why? Because you go home pregnant with facts and ideas and information given to farming and farming scientifically. Over in our county we have a local painter, and driving along the other day I saw his sign and it is such an epigram that it has rung in my mind ever since—"I mix my paint with brains"—and so here in this splendid Congress, we begin to realize that farming, to accomplish the greatest results, must be done scientifically and that we must mix some of our grey matter with the soil.

In our good state and in your good Congress, we commend and congratulate ourselves that we have the president, as your president, of the greatest agricultural college in the world, our Manhattan Agricultural College (Applause), Doctor Waters, who is one of the greatest agriculturists in the world. That college over there is teaching our young men to grow 30 bushels of wheat where only 20 grew before, and to put 100 to 150 pounds of meat more on a steer. They are mixing farming with brains over at that agricultural college, and so you meet the people who are in touch with and realize the possibilities of this great state of ours.

You good men and women, some of you, came to Kansas years and years ago, a great American desert, and you planted the seed that brought forth the fruit and enabled a hardy race of men and women to transform it from an American desert to a state great in wealth.

I am glad we have our Governor from our sister state of Colorado here today, and we are glad he is coming over to Kansas. We hope he will be so pleased with Kansas that when he goes back to Colorado, he will then decide to come back to Kansas and be one of us. I extend that same invitation to all of you. We hope you will fall in love with our state, and while other states will lose by your absence, yet grand old Kansas will be gratified by your presence.

Speaking about our resources a little more, the last year was a happy one in our great state—a year that raised nearly 200 million bushels of wheat and at the same time over 100 million bushels of corn, and with fine livestock growing thick as mosquitoes! We have gas as well as coal, lime, zinc and lead, and our poultry industry created 47 million dollars' worth of wealth, 7 million dollars more than the annual gold output of the United States. So we think it is peculiarly fitting that you come to a state rich in agricultural pursuits and that we have those natural resources, but we want more men to come to our great state of Kansas. We expect to be the first state that will build the connecting link in the great transcontinental road and make an ocean-to-ocean highway. Our good people are impressed with these ideas and we are living up to this idea and it is a high ideal, and your dry-farming, too, will be enlarged, which is not only a splendid thing in itself but in every interest, and you will teach the men and women how to live—even going into detail, as to how to fertilize and enrich the ground and teaching the wonderful effect of your methods on Way and Rome became the center of civilization. Men came to this state our great country. And so, instead of circumscribing and putting a limit to that which means much to the world, a Dry-Farming Congress, your activities have become more prominent and as they become wider and better known the benefits will be that much better.

My time is limited and I am just here as executive of this state to welcome you to our grand old state of Kansas. Caesar built the Appian Way and Rome became the center of civilization. Men came to this state years ago, and have developed it until today we are the greatest state in the universe. So, as executive of our state, I am proud of what our farmers are doing, and they are doing a great, great work in this state. We have the greatest system of public schools in the world. We have a most wonderful enrollment in our public schools. Kansas, with half of the population of some of the other states, has 6,000 enrollment in the University and Agricultural College. Last year we only had 676 paupers in Kansas.

Is it a wonder that we are proud of our great state? And again as executive of our state, I welcome you to Kansas, with a soil as fertile as the Valley of the Nile, as full of possibilities as the Garden of Eden, and as wonderful as an all-wise Creator could fashion it.

CHAIRMAN SOUTHWARD:

If any of you have any doubt as to the state of Kansas being the greatest state in the world, I know that doubt has been dispelled, but Kansas would not be Kansas if it were not for Wichita. Today most of the

important publicity that emanates from the state of Kansas is coming from Wichita. The Wichita people welcome you here. We are glad to have you here, and you may know the spirit of Wichita people when you look around at this magnificent building which has been thrown open for the session of this Congress. I now take pleasure in introducing to you Mayor W. J. Babb.

MAYOR BABB:

It is a recognized fact that while the Dry-Farming Congress that meets here today is not so large a body as its announcement would seem to indicate, yet the quality of its membership and the vast human interests it involves and promotes make it one of the most important assemblies known to our present civilization. There is one other organization of the kind known to civilized mankind and with headquarters at Rome, but because of the clash of arms and deadly strife in Europe its usefulness has been impaired. Hence this is the only meeting of the kind known to the people of the Earth this year. The importance of its purpose cannot be overestimated. It is an educational institution looking forward and attempting to teach the human race how to sow, cultivate, produce and gather from the arid soils of the earth the necessary food products for the teeming millions that will be there some not very far off tomorrow.

It is said that 50 per cent of the earth's soil that can be tilled has insufficient rainfall to produce good crops by the usual methods of tillage. If these great areas of millions of acres of arid lands can be made to produce freely of foods for mankind, then this convention having such a purpose in view with the hope of realization is indeed of worldwide importance.

This is shown by the coming hither of learned and earnest men from far-off foreign lands, men of education and position who talk to us in our own tongue. Although many of them are of different races from ourselves, Americans, they do not seem so to us because of their common interest and like education with ourselves in matters to be considered by this Congress. We are glad indeed to have these friends of faraway homes and people with us.

Today we have several Governors of states near by who do us much honor by their presence, which we greatly appreciate; also representatives from 15 states all west of the Mississippi River, except Wisconsin and Louisiana, who are here like the good neighbors they are to help make this Congress a success. Uncle Sam is also here by his most helpful official. Then we have with us representatives of a number of agricultural colleges and experiment stations to give the educational work of the Congress its scientific features. These experts and specialists, including our newly-elected and most distinguished President from the Kansas State Agricultural College, are in keeping and fitly represent the high order of the membership of this body.

Last but not least we have friends who come not officially but in a personal way to take part and see and learn what the Congress does and says for the good of all.

Permit me to say that the city you meet in is one of some 64,000 inhabitants containing a generous and hospitable people, and it is a stirring Western American City having a cosmopolitan citizenship with high hopes for the future of their city and undaunted faith in its future growth and relative greatness.

Now, in behalf of the officials of the City of Wichita, the Peerless Princess of the Plains, and in behalf of her 64,000 citizens, I take the greatest pleasure in extending to those friends and representatives of far away countries, to those of other states and our own United States Government, and to the Governors who so much honor us by being here today, and to you the men of experience and science from institutions of learning and to all others the heartfelt welcome of a truly Western city, the sincere and cordial welcome of a hospitable people, which means come again and come often, because you are always more than welcome!

CHAIRMAN SOUTHWARD:

Organization is one of the most important factors of the day, but I would suggest that we don't try to get out and organize a boom, for the boom might burst, and when it does, it hurts. We have an organization with us here that is very important in the city affairs. Organization means much in city interests and in the state interests, and in fact without proper organization, we do not get much of any place in the way of advancement. This organization is the Wichita Business Association. We are indebted to it for this Congress. It was through its efforts that the Congress was brought here. They made it possible for us to take care of this Congress. It is still interested in the proposition, but I believe it is so far along now that it will take care of itself. However, I want to introduce you to the president of the Wichita Business Association, Mr. F. W. George.

MR. GEORGE:

I speak for the commercial and civic organizations of Wichita.

Useful public gatherings are promoted in these days by commercial bodies, that being one of their functions.

The Wichita Business Association took the initiative step to secure the International Dry-Farming Congress and sent a special party of people to Tulsa last year and has tried to foster it in every way possible during the year. It appreciates the presence of the Congress, as much as the Governor or the Mayor.

Wichita is a happy location for an event like this, a great commercial and distributing center in a great agricultural region where agriculture has reached the very top of success. It is an important grain and livestock center and a city of sightliness and hospitality.

Great agricultural gatherings are schools of education and all well regulated commercial bodies recognize and foster that sort of thing. That is why we are so very pleased to have you with us.

I cordially and earnestly add my word of welcome to you.

Note: Chairman Drummond resumed the chair.

CHAIRMAN DRUMMOND:

We will now hear from a member of the Old Guard of the International Dry-Farming Congress, a man who was on the firing line in the early stages of the game, and who was personally responsible, in a large measure, for the starting of this organization on the road to success. Doctor John H. Worst, president of the Agricultural College of North Dakota, will deliver you greetings for the United States.

DOCTOR WORST:

To respond on behalf of the United States to the expressions of welcome so felicitously uttered by the preceding speakers is a big task to be assigned to me, so young and so unsophisticated! However, we have all heard of Kansas. Like my own state—the greatest of agricultural states, North Dakota—the citizenship of Kansas comprises the best blood in fact of the civilized world. And as for Wichita, we have already experienced her hospitality.

From a population drawn thus from so many sections of the country and welded together by thought and purpose into a homogeneous democracy—except perhaps when it comes to politics,—we naturally anticipate a most friendly reception. The words of welcome so eloquently spoken, therefore, fully corroborate our estimate of the people with whom it shall be our pleasure to sojourn for several days. Moreover, the purpose of this great gathering is sufficient guaranty that not only your hospitality, but your counsel and experience will be appreciated, for every hour will be devoted to the consideration of problems affecting the general welfare.

The International Dry-Farming Congress stands for the reclamation of millions of acres of land in this and in other countries by the application of science to husbandry. It means more food for more people. And since food in abundance and obtained at minimum cost is the surest guaranty of domestic contentment and national prosperity, due consideration should be given to its production whenever the soil and climatic conditions, aided by scientific research, will make food more abundant. With approximately half of the land surface of our globe semiarid in character, so-called Dry-Farming becomes one of the biggest problems that confronts the human family.

The rapid increase of population in the United States is already making increased demands upon the soil. The humid areas are barely sufficient to feed and clothe the present population, under existing conditions of farm management. Within half a century at least two and a half times as much food and raw material for the factories will have to be produced in order to feed and clothe our people as comfortably as they are now clothed and fed.

Basing the natural increase of population of the future upon that of the past and discounting most liberally, by the year 2000, the population of the United States should exceed 400 millions—in fact it should be nearer 600 millions.

To meet the demands of the near future, therefore, not only must the semiarid lands be made productive, but all forms of soil exploitation must give place to scientific agriculture. Conservation of the country's natural resources, of which the fertility of the soil and sufficient moisture to make the fertility available for the growing crops, is more immediate and important than all else, and has become our paramount national problem.

The sciences that bear upon agriculture and their intelligent application to the problem of the farm, therefore, should have as consistent a place in the curricula of the public schools as languages or mathematics; for what is fundamental in the life of a nation should afford the means of culture for all its people, especially those who by occupation assume the stewardship of God's beneficent provision for the life and happiness of all His children, the soil.

This Congress, under the splendid leadership of John T. Burns and his earnest coadjutors, has made a splendid record. It has awakened enthusiasm along agricultural lines where only doubt or unbelief formerly existed. It has done much to awaken not only the national conscience, but agricultural colleges and scientists generally, a more profound study of moisture conservation as the key to successful agriculture in vast regions that would otherwise remain barren and unproductive. The present officials of the Dry-Farming Congress are equally enthusiastic, and the delegates gathered here from so many states and foreign countries is an earnest of the interest that is taken everywhere in extending the area of profitable farming as close as possible to the line of climatic aridity. But the technical discussions that this Congress has to deal with belong to others.

My place on the program is to respond in behalf of Uncle Sam, and I can assure you that the old gentleman is physically well and financially prosperous and most highly pleased with the work that has been accomplished here, and also with the cordial reception which Kansas in general and Wichita in particular, offer to the delegates of this International Dry-Farming Congress!

CHAIRMAN DRUMMOND:

Dr. Worst's splendid response in behalf of the United States is certainly appreciated. We will now hear a response in behalf of the nations represented here. Mr. A. F. Mantle, a distinguished citizen of Canada, occupying the position of Deputy Minister of Agriculture of the province of Saskatchewan, will now address you. Mr. Mantle.

MR. MANTLE:

Mr. Governor, Mr. Chairman, Mr. President, Ladies and Gentlemen: I regard it as a very great honor that I, possibly the youngest member of the foreign contingent—if there can be a foreign contingent in an international gathering—should be requested to take the place of my Minister, whom many of the Old Guard will remember well, but who is prevented from being present on account of illness, to respond on behalf of the foreign representatives to the welcome that has been given this morning.

We certainly appreciate the way in which the Governor of this great state of Kansas and the Mayor of this splendid city of Wichita, and the others who have spoken, have set those of us who are not so familiar with the inside conditions of the United States at our ease, and have placed us in touch with our surroundings—have let us know, in other words, where we are “at.” What possibly we appreciate even more than the splendid descriptions that have been given of the material possibilities and material advantages of this state and city, is the earnestness, the hospitality, and the very kindly welcome which I feel satisfied all the foreign delegates have received yesterday and today since their arrival—a welcome, which is simply an earnest of the interest and good will which is found in my experience all over the United States where it has been my privilege to go, and is the thing which possibly we appreciate equally as much as the great material possibilities and accomplishments of this part of the world.

You will, I am sure, pardon those of us who come from other countries if we still feel, respecting our own country, that its possibilities and in proportion to age, its accomplishments, are equally as dear to us and seem to us to be perhaps equally as commendable as the accomplishments regarding which we have heard; but we can all fully appreciate the cordiality and hospitality which we find everywhere over this country.

I think that the foreign delegates, with no one of whom I have been able to exchange as yet any views on this subject, would wish me to congratulate the United States at this time upon the splendid crops, which in general and taking the country over, I believe this nation has been favored with this year; and we do extend to you those congratulations, and we especially congratulate you on the extent to which those good crops may be attributed to improved agricultural methods rather than simply fortunate climatic conditions. I think that these congratulations come possibly with especial force to this state of Kansas this year, at least insofar as its winter wheat crop, which is possibly its greatest, is concerned. We especially congratulate the state of Kansas on the prosperity which abounds this year. Just to the extent, of course, that you may be getting an increased price for that crop on account of the deplorable condition in Europe at this time, we will refrain from congratulations, and I am satisfied that the farmers and business men of the United States would be only too glad to forego the additional measure of prosperity the war may be bringing them for the time, resting secure in the knowledge that the general prosperity is being retarded. We hope, too, that you may make it possible for your brother farmers in the cotton states to realize from their cotton crop the prosperity which you are realizing from your wheat crop.

In closing, Mr. Chairman, I would just like to say a word to the foreign delegates, and I might state for the benefit of the Congress that, to the best of my knowledge, there are personally present at the sessions, representatives of the American countries, Mexico, Brazil, Argentine, and Canada; from European countries, Greece, Spain, Russia, Turkey; from other countries, China and South Africa, and possibly one or two others that slipped my memory for the moment. I would like to say to those rep-

representatives from these foreign countries who have never yet had an opportunity of attending the sessions of the International Dry-Farming Congress that they will undoubtedly find the sessions of today and the next three days full of interest and full of inspiration; and not only will they find the sessions full of interest and inspiration, but they will find the opportunities they have between sessions of meeting men who are present—men who are carrying on lines of work similar to their own—full of value to them, and I am sure that as to those who may not be of Anglo-Saxon blood, the officers and delegates of the Congress want them to feel thoroughly at home and will greatly appreciate it, if, when there is a man with whom they want to get in closer touch, they will feel absolutely free to do so and approach that man, whomever he may be, with the security that he will feel honored in being approached with that end in view. To those who, like myself, have been privileged to attend two or three private sessions of the Dry-Farming Congress I need say no word, for I feel satisfied that they are in the same position as I am—very pleased to be back at the Congress once more and feeling very well satisfied that, as usual, we shall find the sessions of great interest and value and go away with the feeling that it has indeed been good for us to be here.

On behalf of the foreign delegates, then, Mr. Chairman, I thank the Governor of Kansas, the Mayor of Wichita, and the other gentlemen who have extended so cordial a welcome; and feel sure that the delegates will feel that it has been worth their while to make the journey, whether long or otherwise, to be here this week.

I thank you.

CHAIRMAN DRUMMOND:

Kansas has done a great deal for this Congress—as much or more, I presume, than any other state has ever done. Not the least she has done is the giving to us of our present President, Doctor Henry J. Waters, President of the Kansas Agricultural College, whom I sincerely believe to be the leading agriculturist in the world today and the leading farm educator. I will now introduce Doctor Henry Jackson Waters, President of this Congress. He will assume the gavel and have charge of the deliberations from now on. Doctor Waters.

PRESIDENT WATERS:

Mr. Chairman, Men and Women: I am deeply appreciative of the honor you have done me in selecting me to preside over the sessions of this Congress and I shall endeavor to give my best attention at all times to reflect credit, so far as it is in my ability to do so, upon the Congress that is here assembled.

The hour is too far spent for any formal remarks from me on this occasion and if you will permit me, I will just informally express my appreciation to the friends and officials of the institution who have labored so successfully to bring about the splendid Exposition and Congress now open.

My long-time friend, the Mayor of Wichita, and some of the other speakers from the city referred to what happened to Wichita some years ago when it took on a boom somewhat larger than it could handle, and it suggested a story I heard a few days ago about a boy who was begging his aunt for a fourth helping of plum pudding. His aunt said, "It is not good for you." He said, "Why, what will it do for me?" His aunt said, "A few days ago a boy ate too much plum pudding and he burst, and that is what will happen to you!" The boy hesitated a moment and then said, "It was not the plum pudding's fault because he burst. It was because there was not enough boy!" And that was what was the matter with Wichita 20 years ago when she took on a boom. There was not enough Wichita; but today there is plenty of Wichita to take care of any boom that the genius and enterprise of the people can put on it. They have made the most excellent provisions for this Congress. I have not had the pleasure of attending all these Congresses, but I am certain that no Congress I have ever attended has had better attention from the local people, and I thank the people of Wichita on behalf of the Congress for their many courtesies.

May I be permitted to present some greetings in which you will be interested? In the first, is the greeting from our distinguished President at Washington; also a message from our distinguished Secretary of State—from the Director of the Panamerican Union, John Barrett. There is a message from the distinguished Minister of Agriculture of Saskatchewan, and former president of this Congress, who unfortunately, as has already been announced, is too ill to be here. I shall not take occasion at this time, but I shall request Dean Jardine, to whom this letter was addressed, to read it at length at some subsequent session; but in this informal way I present to you his warmest regards and felicitations, and last but not least, I have a message from the man who made this Congress and the man who has given of his strength to the full limit and whose strength is now impaired, possibly permanently, on account of his great and untiring devotion to this cause—John T. Burns, who was thoughtful enough to send this telegram. There are many other messages here, but I shall not take the time at this moment to read them and I am aware that the time is nearly spent.

Message From President Wilson.

September 18, 1914.

My Dear Mr. Faxon:

It is a matter of sincere and unaffected regret that I cannot attend the International Dry-Farming Congress. The labors of the association not only command my most sincere approval, but they seem to me peculiarly important. This country has been all too slow in bringing her forces of knowledge and energy into cooperation in the interest of the conservation and development of her resources. Nothing has shown more clearly than dry-farming the necessity for a close alliance between the man of science and the man of action, and I know of no national activity which can be more assisted or rendered a more lasting service by the use of scientific methods and the application of scientific knowledge than the agricultural. My inter-

est and sympathy go out to the work you are doing in a peculiar degree.

Cordially and sincerely yours,

WOODROW WILSON.

Mr. Ralph H. Faxon, Executive Secretary,
International Dry-Farming Congress,
Wichita, Kansas

Message From Mr. Bryan.

Department of State,
Washington, October 2, 1914.

My dear Mr. Faxon:

I regret exceedingly that it will be impossible for me to attend the Dry-Farming Congress to be held in Wichita October 7 to 17.

While I am not fully informed as to the success which has attended many of the experiments in dry-farming, I am deeply interested in anything that affects the welfare of the Nation and would be glad to profit by the discussions which will take place at your Congress. If the speeches are to be in book form, I shall be pleased to have a copy, that I may avail myself of the information which is brought out.

Yours very truly,

W. J. BRYAN,

Mr. R. H. Faxon,
International Dry-Farming Congress,
Wichita, Kansas.

Message From Mr. Barrett.

Panamerican Union,
Washington, D. C., September 23, 1914.

Dear Mr. Faxon:

On account of the overwhelming pressure of work here resulting from the effect of the European war on Latin America and the demands already made upon me from different parts of the country to discuss the PanAmerican situation, I regret extremely that it will be impossible for me to attend the International Dry-Farming Congress which will be held at Wichita, October 7-17.

I realize the honor of your invitation and the importance of this gathering. I want you to know of the continued interest of the PanAmerican Union and myself in the work of the International Dry-Farming Congress. The agitation which it is carrying on and the contribution which it makes to the knowledge of this important subject are already having an effect throughout Latin America. There is no question in my mind whatever that dry-farming must prove in the future a great help to the material and commercial development of the Latin American countries which have vast areas subject to dry-farming. At this very moment the war has emphasized the solidarity, interdependence and mutual interest of the countries of the Western Hemisphere, and the countries to the south of us are watching closely the cooperation which the United States may give them in solving their commercial problems and in helping them to tide over the

unfortunate effects of the European struggle. Any note, therefore, which may be struck at the International Dry-Farming Congress which shows interest in Latin America will meet with reciprocal feeling in that part of the world.

Extending to the International Dry-Farming Congress salutations on behalf of all America as represented by Panamerican Union, I remain,

Yours very cordially,

JOHN BARRETT,

Mr. R. H. Faxon, Executive Secretary-Treasurer,

The International Dry-Farming Congress, Wichita, Kansas.

Message From the Chinese Minister.

Chinese Legation,

Washington, October 5, 1914.

The President,

Ninth International Dry-Farming Congress,

Wichita, Kansas.

Sir:

I beg to inform you that the Ministry of Agriculture and Commerce of the Republic of China at Peking has appointed Mr. Koliang Yih, Second Secretary of this Legation, to represent the Ministry as its official delegate at the Ninth International Dry-Farming Congress, to be held at Wichita, Kansas, from October 7th to October 17th, 1914.

I am, my dear Sir,

Very faithfully yours,

K. F. SHAH,

Chinese Minister.

Message From Speaker Clark.

The Speaker's Rooms, House of Representatives,

Washington, D. C., October 5, 1914.

Mr. R. H. Faxon, Secretary-Treasurer,

Wichita, Kansas.

My dear Mr. Faxon:

I have your invitation to attend the Dry-Farming Congress, but as I wrote you a few days ago, it is utterly impossible for me to get away from here, as I can appoint a Speaker pro tempore for only one day.

I thank you for your cordial invitation.

Your friend,

CHAMP CLARK.

Message From John T. Burns.

Rochester, N. Y., October 6, 1914.

Dr. Henry J. Waters,

President International Dry-Farming Congress,

Wichita, Kans.

Cordial greeting to yourself and splendid men who are your coworkers, and my heartfelt wishes for successful convention of world's greatest gri-

cultural association. Regret ill-health forced me to retire from active connection and business prevents me from attending reunion of the men who have directed the great propaganda, which is adding millions of productive acres to the West every year.

JOHN T. BURNS.

PRESIDENT WATERS:

Are there any announcements?

DEAN JARDINE:

If it is in order I should like to place a motion. I should like to move that a committee of 12 be appointed by the chair to solicit membership for this organization. An organization of this character has to be financed in some way. About the only way we have of supporting the International Dry-Farming Congress is by obtaining an annual membership which costs \$1.00. This is one means of support, and the other means is what we are able to get out of the statements of the sessions held. I am sure that these proceedings are well worth the additional 50 cents required to receive a printed copy of what goes on here; and in addition to this, for your dollar, you will receive a copy of the monthly bulletin which presents timely discussions of local interest, dealing with dry-farming in particular and farming in general. I think we all ought to support this movement by subscribing a dollar for regular membership and 50 cents for proceedings, and I hope you will keep this in mind.

PRESIDENT WATERS:

Is this motion seconded?

The motion was seconded.

PRESIDENT WATERS:

It has been moved and seconded that a committee of 12 be appointed on membership. Are there any questions? The motion is carried. The chair will announce the committee a little later. Is there any further business? Are there any other committees? The chair desires to call the attention of the delegates to the fact that the state and foreign delegates are empowered by the Constitution to nominate and elect each a member of the Committee on Resolutions and each a member of the Committee on Nominations. I suggest that it would be convenient for the various state and foreign delegations to arrange for their meetings this afternoon at the close of the afternoon session and that they be prepared Tuesday morning or possibly at the evening session this evening to announce their members of these important committees and also their member of the Executive Committee. Keep that in mind. There should be a member of the Committees on Resolutions and Nominations, and a member of the Executive Committee.

May I call your attention in just a word to the program this afternoon and the evening and the rest of the Congress? You will observe from the program the very distinguished speakers—men brought from all the quar-

ters of the earth, and this is not a padded program. You will find the people are here, with very few exceptions. The distinguished list of people announced for this afternoon are all here, with one or two exceptions, and in those cases we will substitute someone just as good. The program is notable and you will not be disappointed, and this evening we are honored with the presence of the governors of a number of other states and I know you will be pleased to hear the messages they bring to us.

If you will permit me now I will announce the Committee on Membership, just provided by your motion. I will appoint

COMMITTEE ON MEMBERSHIP

A. M. McOmie, Arizona	Lewis A. Merrill, Utah
E. P. Humbert, New Mexico	Axel Axelson, Colorado
W. C. Edwards, Kansas	A. F. Mantle, Canada
M. F. Greeley, Minnesota	Manley Champlin, South Dakota
Thomas Knight, Missouri	H. M. Bainer, Texas

Is there any further business?

Announcement of Secretary Faxon as to accommodations, etc.

Adjourned.

MONDAY, OCTOBER 12

AFTERNOON SESSION

Rollcall of States

A handsome gavel, of inlaid woods, and with a metal plate bearing the inscription, "Presented to the Ninth Sessions of the International Dry-Farming Congress by the Kansas State Manual Training School," was formally presented to President Waters at the beginning of the session, for use during the sessions.

The Congress was called to order by President Waters. The session was given over to the rollcall of states.

The chair introduced A. M. McOmie, who responded for Arizona.

Arizona

MR. M'OMIE:

Arizona's agriculture is comparatively young, not really having its beginning until 1880. The peculiarly uncertain, uncontrollable water supply of the state, even after this date, has made its development slow, due to the necessity of having large sums of money and intricate engineering projects, properly to conserve and control the erratic streams. Nevertheless, certain progress has been made, with the advancement taking place along the following lines: Irrigation, dry-farming, stockraising, marketing, schools, and social conditions.

Irrigation.

Under this head, it is interesting to note the gradual increase of the irrigated area by white settlers at its different dates. In 1854, 2,000 acres; 1890, 65,821 acres; 1899, 185,396 acres; 1909, 227,770 acres; 1913, 328,770

acres were irrigated; the increase in the last four years has been forty-four and three-tenths per cent. It is conservatively estimated that the possible area susceptible to irrigation exceeds one million acres, and at the present rate of progress, it will be only about ten years until this area will be under the ditch.

The water supply for the lands of Arizona is derived from three sources; first, gravity water, accumulated in storage reservoirs, or diverted from natural stream courses; second, subterranean or pump water; and third, runoff or flood water. At the present time, there are some 308,770 acres irrigated by the gravity system, about 10,000 acres from pumping and 10,000 additional acres from flood water and pumping. The greatest development in the last two years has probably been by the pumping system. It is estimated that there are fully 750,000 acre-feet of ground water at 50 feet and less depth from the surface, available annually for pumping. This in round numbers is sufficient to irrigate 200,000 acres, with a comparatively low duty of water. More recent investigations, however, seem to indicate that water may be pumped from greater depths than fifty feet, where certain marketing facilities prevail, and soil conditions are right; in which case probably double this area would be included by bringing in sections where the lift is 75 to 100 feet. With the improved types of deep well pumps, and the low cost of fuel-burning engines, it is difficult to estimate the development in the next ten years in this direction.

In addition to the areas irrigated from gravity and pumping by white settlers, the Indians of Arizona, by the use of flood water, produce crops of corn, wheat, squashes, etc., from fully 10,000 acres. There are many Indians who have a permanent water supply, which is estimated to cover fully 5,000 acres.

The area included under flood water is most difficult to estimate, as the floods are not certain, one section being flooded one year, and not the year following. However, settlers realize the value of favored positions to receiving flood waters, and snap up quickly, any such sites. Reclamation under this method is therefore doubtlessly increasing.

Stockraising.

Stockraising is one of the oldest and most extensive pursuits in the agricultural field in the state. Formerly, immense herds of cattle and sheep were owned by one concern, and more or less monopolized the ranges, but with the advent of the forest service regulations, and the increased irrigated areas, intensive stockraising is making rapid advancement, especially in point of quality. The ranges in the past eight years have been increasing with cattle from 300,000 head, to about 800,000 at this time. In the present conditions of the ranges, this is their maximum carrying capacity. The stockmen realizing this, are looking toward the improvement of their breeds, and of the ranges. More cattle are being fed and fattened every year in the irrigated valleys, and a greater number of cattlemen, each with smaller herds, are appearing. Under such conditions, closer attention is given to the size and quality of the animal, and to keep-

ing his range in a productive condition. A big part of the risk of the old system is thereby eliminated.

Fully 50,000 head of cattle were fattened in Salt River Valley alone the past year, while two years previous, not more than 25,000 head were fed in this district. This is due to several reasons; one being the desire of the farmer to increase the price of his alfalfa hay from eight to twelve or fifteen dollars per ton, and another being the desire of the stockman to increase the price of his steer from thirty to sixty dollars per head. Progress in this direction is very marked since parties concerned all receive substantial financial reward. By the introduction of cotton, and the growing of corn, feterita and milo, valuable finishing foods are supplied to supplement the alfalfa, and make feeding conditions ideal and popular.

In the breeding, rapid improvement is observed. Each year hundreds of pure bred animals, mostly males, both of sheep and cattle are imported for the range. Especially is the improvement of breeds noticeable in the dairy stock. In the past two years, the pure breed dairy cattle have been almost doubled in the state. Certain sections are specializing in dairying. Last year, twelve silos were built in the Gila Valley alone, principally to care for the industry.

Great strides in the hog business are bringing this class of livestock to the front, farmers now realizing that alfalfa with corn or some of the grain sorghums is ideal food for hogs. The number of hogs has accordingly increased very markedly in the last two years. This is also true with poultry and ostriches.

The sheepowners have prospered the past year, receiving high prices for both wool and mutton and having excellent range conditions. In 1910, there were about one million sheep in the state; now this is increased to fully one and one-quarter million head.

Dry-Farming.

Five years ago, dry-farming was scarcely known in the state except among the Indians. Until the present time too, rather cautious development has been going on in this line, due to lack of information concerning the best methods and crops for this section. Our experimental data, however, are at present accumulated sufficiently to warrant recommendations of certain areas to this class of farming. Within the last two years, the dry-farming area has been quadrupled. At present, it is comparatively small, including some 50,000 acres. The following facts illustrate something concerning its development:

On one forest reserve in the northeast part of the state, there have been 261 applications for 160-acre homesteads since 1906. Of this list, 42 occurred for 1914, up to July 1. In the last four years, more than half of the entire number of applications have been filed. There are over 25,000 acres in this one reserve that are being farmed profitably by dry-farming. Again, in Coconino County, 29 homesteads were applied for from August 1 to September 15, 1914. The gradual increase in the acreage at elevations where the rainfall is ten inches or less, by supplementing the rainfall with

pump water, is very marked. The areas to be reclaimed in this manner in the state are not even remotely known, but it is safe to figure at least one million acres. There are fully 1½ million acres that are susceptible to dry-farming with the natural rainfall. Especially attractive inducements are offered for a combination of stockraising and dry-farming over all the best sections of the state. The first silos in the dry-farming areas were built last year, one at Prescott Dry-Farm, and one at Lakeside near the Snowflake Dry-Farm. By using these means of curing the corn and sorghum crops, the carrying capacity of our stock ranges will be vastly increased, as well as the quality of our stock. The old system of running stock on the range the year round, and trusting to luck for favorable seasons, must give way to the scientific process of supplementing ranges with ensilage, grains, etc., grown right in the midst of these ranges.

Progress therefore, in this line of development must naturally be very rapid within the next ten years.

Marketing.

Marketing conditions have been very much improved by the extension of some railroads, and by the work of the Corporation Commission and railroads in adjusting freight rates. The isolated position of Arizona must needs compel the state to depend on the railroads to carry its produce to the big markets. These carriers are much interested in the development of the state, and accordingly adjust the rates to assist the farmer. There are also being formed from time to time, produce associations such as the Cotton Exchange, Cantaloupe Growers Association, Poultry Association, etc., that very greatly assist in finding markets for the produce.

The past year has also been one of prosperity for the many mines of the state, and these always supply splendid markets when they are operating to full capacity.

Schools.

Along with the material advancement of the state in agricultural lines, the educational features are progressing. Within the last two years, agriculture has been introduced into all of the high schools, normal schools, and schools of similar rank in the state. Keen interest is being centered on teaching agriculture in the grammar schools. Arizona generally pays higher salaries to these teachers than any other state. The average salary for Coconino County as an example is \$83.50 per month with ten months school.

The enrollment of agricultural students in the university has doubled in the last two years. The enrollment of farmers for short courses, and the attendance on the Demonstration Trains and Farmers Institutes have been increased from 17,000 in 1912, to approximately 40,000 in 1913, and over 50,000 in 1914.

Social Conditions.

Social conditions in the cities are on a high plane. In many of the rural school districts, Community Houses, Women's Clubs, Men's Clubs,

Boys's and Girls's Clubs, etc., etc., are being organized each year, which materially improve the social conditions in the rural communities. The intelligence of the farming population is being raised to a very perceptible degree. The peculiar local farming conditions require every farmer to be a student and a specialist, to attain the highest degree of success. The outlook for agricultural progress generally in all lines, is extremely promising.

With the growing demand for rich lands, both for irrigation and dry-farming purposes, with the prevailing healthful climatic conditions, with progressive schools, and with great possibilities of her mines and timber, it is only logical for thousands of people to turn their eyes toward Arizona for a future home.

PRESIDENT WATERS:

There is a slight change in the program, and I know you will be pleased that we have made it. We are honored this afternoon by the presence of one of Kansas's foremost citizens, a man of long experience in the House of Representatives, and Chairman of the Committee on Agriculture. I want to introduce that man, Charles F. Scott, of Allen County, Kansas, who will speak to us.

MR. SCOTT:

I fear it is a bit incongruous, ladies and gentlemen, that a delegate to the Dry-Farming Congress should have been so delayed in reaching its sessions by an all-night downpour of rain, that the train could not make its usual time; and I regret exceedingly that an important engagement compels me to leave on an early train, but I am very glad and proud indeed to add my word of greeting. Inasmuch as all the other words have come from those in official situations, perhaps a word from a private citizen might not be out of order in addition to those which you have already heard.

I never have had the privilege of attending a Dry-Farming Congress before, but I have taken note of the work it has done, and I feel the men who are responsible for that work may congratulate themselves on the fruits of their labor. Your president has referred to the years when I was a member of the Committee on Agriculture in the House of Representatives, which suggests to my mind that during the 10 years of my membership on the Committee on Agriculture, dry-farming was officially recognized for the first time, we may say, in the United States. It was during those 10 years that the Reclamation Service was established and the most constructive legislation was put under way. It was in those days that the Forest Service was put on a substantial basis. I remember well that when I first went upon that committee, the annual appropriation for the Forest Service was for \$70,000, and the last bill that came in was for 5 millions per year—a splendid demonstration of the growth of this great constructive work in this country.

And if anything else were lacking to bring congratulations to those who have been responsible for the sessions for this Congress, I think a visit to the Exposition in this city would be sufficient. I am struggling

very hard to refrain from calling your attention to the fact that the county which is my home has taken the three leading prizes at this Exposition, and the man in charge of it will come home with \$500 or more in his pocket as a result of his enterprise. He really thinks he would come home with more were it not for the partiality of the management!

But there are people from other parts of Kansas who will go away with a new idea of the agricultural resources of this state, and there are people from other states who will go away with a new idea of the agricultural possibilities not only of Kansas, but of the other states of this great Middle-West and Far-Western section. It is a splendid work this Congress is doing, and an inspiration to every American citizen who may come here, and it cannot fail to be of advantage to our whole nation.

It seems to me that the time was never so ripe and promising for the farmer to come into his own as it is right now. No American citizen, of course, would be so lost to all sense of humanity as for a moment to entertain a feeling of exultation because of the strife between the nations of Europe, and yet it would be very foolish on the part of any citizen or nation which is not engaged in that desperate war to fail to consider the question of measuring all the conditions which that war will bring upon the five great nations of the world engaged in the deadly conflict.

The exports of England, France, Germany, and Austria, a considerable part of them agricultural in their nature, amount to something over 7 billion dollars annually. Of course, those exports will not immediately cease, but they have been much curtailed. If the war lasts six months more they will be more strongly curtailed, and if the war should continue another year, they will almost entirely cease. It will develop upon the other nations of the world to supply that lack, and whether that may be in manufacturing or agriculture, the farmer is the one upon whom the burden will naturally rest. If it be necessary for us to expand our manufacturing industries, it will fall upon the farmers of this country to feed the laborers, and if the necessity should arise for further food export from our country, it will fall upon the farmer to supply that necessity, so it seems to me there never was a time when this Congress could feel it so certainly had a mission as right now.

With all our homestead lands practically absorbed, the chief avenue we have for the further development of agriculture lies in that section of the country, both here and farther north, where until this time farming has been sporadic. The work of this Congress is doing a great deal to make that farming an established part of the industry of the world. Therefore I am proud to be here today, to express my pleasure in extending the felicitations which are due on this occasion and to give you my congratulations and the most cordial hope that these sessions may be the most successful and most notable of all the sessions the Congress has yet held.

I thank you very much.

PRESIDENT WATERS:

The next state on the rollcall is Arkansas, to be responded to by Mr.

E. N. Hopkins, editor of Fruit and Farms, Fort Smith. Is Mr. Hopkins present? If he is not here, then California is to be responded to by Professor John W. Gilmore, Professor of Agronomy, in the University of California at Berkeley. We will pass them for the time. Colorado was to be responded to by Dr. Lory, President of the Colorado Agricultural College, who will be well represented by Mrs. E. T. East, of Denver.

Colorado

MRS. EAST:

Mr. President, Ladies and Gentlemen: It was very unexpected to me that I was to represent our distinguished President of the Agricultural College, Doctor Lory, and I suggested that there was one of Doctor Lory's assistants, Doctor Gillette, here who would say a word in behalf of Colorado. If I had known I was to be called upon, I should have been glad to gather some of the figures and present some of the advantages of that great commonwealth to you. As it is I can only give you a few ideas of the width and extent of our resources.

In a general way, our resources are three: Mining, of which you have all heard; agriculture, of which you are all learning; and manufacturing, which is rapidly coming to the front. Years ago, when Colorado was known only as a mining state, there were many who came to mine and stayed to plow. The man who failed in the mines found there was a rich living for the one who would divert the waters of the rivers and supply the bread for those who were more fortunate in the mines. So agriculture came to the front.

They said, "It is a wonderful soil if you can just get the water on it," and for a great many years all that was known of farming in Co'orado was the irrigated farm. But, largely through the benefits of this Dry-Farming Congress, the methods of deep tillage and water storage have come to the front and there are at the present time 3 million acres under cultivation, and successful cultivation, by dry-farming methods. We speak of it as non-irrigated methods but it is the dry-farming method nevertheless that has worked the transformation of these 3 million acres. There are many more million acres waiting for the plow and for the man to handle the plow.

My predecessor spoke of the coming scarcity of homestead land, yet Colorado has 20 million acres open to homestead. Not all of this 20 million acres is good, arable land, as, if it were, you can realize how quickly it would be gone.

Frequently I have inquiries that say, "How close to Denver could I take up a homestead and could the children walk to school?" I have an inquiry from Boston in which a lady inquired if there were good places to board in Denver and if she would be safe alone and unguarded. That shows perhaps that in America, in the most progressive country in the world, there is a vast ignorance about us. Someone wrote to know about the land near Grand Junction and asked if it were near enough that the children could go to Denver to school! A lady wrote to us asking what car to take to Yellowstone Park and would they have to take a lunch? In the work of the Greater Colorado Bureau, we meet a great deal of this ignor-

ance, and this is one thing I have to meet and overcome, but in the coming days a little distance from the railroads is not going to matter. Twenty miles today is less than five ten years ago, and there are large quantities of land, millions of acres, within easy reach of towns and railroads.

Two years ago, which are the figures I remember best because those were embodied in the last folders I wrote,, all mining, including coal amounted to less than 50 millions. Agriculture, including its various branches, amounted to nearly 90 millions. While we are mining more gold and silver than ever in our history, our agriculture is coming up rapidly. Last year this government gave us an increase of 20 millions over two years ago, bringing our agricultural receipts for this year up to close to 250 million dollars.

Now it follows with such quantities of raw materials, there must be a large amount of manufacturing. Manufacturers in every line are flourishing in Colorado, not only because of the raw material but because of the improved water power, the coal and the easy facilities but because of the The difficulties that have stood in the way of extensive manufacturing are rapidly being done away with—unfavorable freight rates, etc.

Perhaps in speaking of Colorado, I should mention one of our great assets, and that is our great climate, because, say what you will, our beautiful days, our splendid nights for sleep, our invigorating atmosphere, make work a pleasure—give us a spirit of civic pride without which all work is valueless. Our city of Denver is full of people who came to die and remained to grow stout, and so many of us went there invalids and have grown husky under the invigorating atmosphere. We are proud to call ourselves the "Switzerland of America." We have 29 peaks higher and more beautiful than Pike's Peak. It was the first of the Colorado mountains that came to notice and so geographically it has come into fame, but we have 29 that are higher and their surroundings even more picturesque than Pike's Peak, and we have the gorges and the canons and the other wonderful things to see. You work today and tomorrow you go on a picnic, and you all know that old saying, "All work and no play," and what is true of Jack is true of his wife and children everywhere. Of course, in the winter we have our storms, but in between the storms we have the sunshine, and so we claim it is the land of almost perfection.

I have not touched on our schools and on the millions we are spending for good roads, and it costs money to build roads over those mountains, then blast out the solid rock. Almost the only thing we are short of in road building is convicts. Colorado has established the honor system among her prisoners and it is hard to get enough convicts to work on the roads.

I thank you very much for your attention, and I want to assure you how deeply I appreciate the honor, not only of being a delegate to this great Congress, but also for the honor of being allowed to address you this afternoon.

PRESIDENT WATERS:

The next state to respond is Idaho. Is Professor Iddings here? If

not, is there someone to represent him? The next state is Kansas, sunny Kansas, and the response will be made by Dean W. M. Jardine, Director of Experiment Stations, at the Kansas Agricultural College.

Kansas

DEAN JARDINE:

It will keep me going even to start to tell of some of the things that the State of Kansas has engaged in agriculturally during the past 12 months, or since the last progress report was made to this organization.

I will not devote any of the five minutes allotted me in calling to your attention the extensiveness of our agriculture, because you all are aware that Kansas plants 8 million acres to corn, 9 million acres to wheat, from 2 million to 3 million acres to sorghums, and over 1 million acres to alfalfa every year. I would rather, and will, speak briefly of the work we are engaged in in endeavoring to make these several acres produce larger yields at a minimum cost, and with the least permanent cost in time, money, and loss in soil fertility.

The two big problems confronting us of Kansas, as in most other states, are: (1) making every acre now under tillage more productive, not only temporarily but permanently; (2) and bringing under profitable management all of the state's land, which is over 50 per cent of its total area, which has never been brought under the plow.

In the solution of either of these problems we feel that livestock must play a very prominent part. We are using every bit of skill and energy that we possess in trying to impress upon the farmers of Kansas the importance of maintaining the fertility of their soils, physically and chemically, and that the most economical method of doing this is by growing a diversity of crops in the rotation, and feeding a large percentage of the products of the soil to livestock on the farm so that a part of the fertility taken from the land by the crops may be returned to the soil in the form of manure.

In western Kansas we are encouraging the growing of the sorghum crops for forage and for grain. To encourage their use, we have conducted feeding tests to determine the feeding value of these crops compared with corn, either as silage, or as dry fodder, or as grain.

At our Hays Branch Station, where we have under control over 5,000 acres of ground, we are carrying over 400 head of stock cattle of the four main beef breeds. We are using these animals in feeding experiments of a practical character. We have absolutely determined in the last two or three years that silage made from the sorghums, either sweet or non-saccharine, produces as economical gains as silage made from corn.

We have also found through our feeding tests that where we have a supply of silage, a succulent food, we are able to utilize straw as a roughage. In other words, we have found that we can bring stock cattle through the winter in good, thrifty condition on a ration of silage made from the sorghums, and straw, and a small amount of alfalfa or cottonseed cake, or linseed cake. Such a ration for western Kansas is practicable, because the

sorghum crops are the ones that do best in the western one-half of Kansas, and there is always an abundance of straw. The cost of bringing a growing animal through the winter, need not exceed 6 or 7 dollars when fed the feeds here indicated.

Up until the last few years our sorghum fodder and the corn fodder, and practically all of the straw, have been destroyed or not utilized. With the advent of the silo, either the pit or the upright, we are able to convert these byproducts into meat, and thus make possible the carrying of livestock on every western Kansas farm. We have found that two acres of western Kansas land, when planted to sorghums, will produce from 8 to 10 tons of silage, or enough to carry an animal practically a year, when balanced with straw and a small amount of alfalfa or some other protein feed.

Farmers generally in this state are beginning to recognize the importance of growing less wheat and more forage crops and more livestock on their farms. They are also beginning to realize that the business of farming is very intricate, and that there is a right time for every operation connected with growing a crop, and that the production of profitable yields is absolutely dependent upon the way the soil has been managed preceding the planting of the crop as well as during its growth. They also are beginning to realize that only part has been done when the crop has been grown, and that even a more important part is the proper utilization and marketing of that crop. They are beginning to see that it is not only a question of how they can make the land produce more, but how they can get the most profit out of what they produce.

While the dry-farming methods of growing crops are absolutely necessary in western Kansas, where the rainfall is 22 inches and less, these same methods are found highly profitable in any section of our state. We find in western Kansas that a 6-months summer-fallow produces the best yields, and a 2-months summer-fallow in eastern and central Kansas, where the rainfall is 30 inches and more, brings about the same results as does the longer fallow in western Kansas where the rainfall is less. The dry-farming methods which has to do with the conservation of moisture are coming to be regarded as important methods to use in the production of crops in regions having a heavy rainfall. They are no longer confined to areas of limited rainfall. It is rapidly becoming recognized that drought in any agricultural district is the limiting factor usually in crop production.

Even in districts having 60 inches of rainfall, there often are times when it does not fall at the time when the crop needs it most, so that it is up to the farmer to hold it in the soil when it does come until the crop can use it most profitably. We are impressing this fact upon our eastern Kansas farmers, where the rainfall is 40 inches, as well as upon those in western Kansas where the rainfall is less than twenty inches.

During the past 2 or 3 years we have suffered more severely from drought than ordinarily, but in the long run the state will profit as a result. It is in time of drought, when going is difficult, that farmers, like other people, are most receptive to receiving advice. So in Kansas during the last two or three years farmers have accepted more readily than ordin-

arily the suggestions made by representatives of the Kansas State Agricultural College, and I am sure that anyone familiar with the business of farming in Kansas during the past three or four years is convinced that the standard is considerable higher at the present time than it was five years ago. There are more farmers in the state today that are farming in accordance with the correct methods than ever before.

We feel rather optimistic in Kansas about the future of our agriculture. We also feel rather prosperous this year, even though the two previous years were unusually severe. Our tremendous wheat crop, together with our other crops above normal, has wiped out the deficits, if there were deficits, resulting from previous droughts, and we now have money on hand to provide ourselves with more modern conveniences and to provide more recreation for the people of the country.

To summarize, I would say that our farmers have made remarkable progress in this state in the past year along two lines: (1) in the employment of better methods in management of their land and in the growing of crops; (2) in the utilization and marketing of the crops grown, through the introduction of the silo, and more livestock on the farms of Kansas.

Whether or not we are conforming to what is commonly considered as dry-farming methods, I will leave for you to judge. Personally, I feel that in addition to the growing of crops, dry-farming is broad enough to include the utilization of crops produced, and the management and handling of livestock. Without the consideration of these two features along with the production of crops, dry-farming will not accomplish all that it might.

PRESIDENT WATERS:

May I take just a moment to call the attention again, to the meeting of the Congress of Farmwomen in the auditorium above? If the ladies present are looking for that convention and have drifted in here by mistake? We are glad to have them stay here or go up there as they see fit. And if I may ask Dean Jardine to take the chair, I shall do so, as I am compelled to go to another meeting for a little while.

DEAN JARDINE:

The next report is to be made by Andrew Boss, Agronomist at the Minnesota Experiment Station.

Minnesota

MR. BOSS:

While it is not strictly in order to talk about wet weather and rainfall at a Dry-Farming Congress, it must be said that Minnesota has experienced a year of abundant rainfall, good growing weather, and a year of more than usual agricultural prosperity. The barns in Minnesota are full of hay. The surplus is stacked in the open field in many sections of the state. Notwithstanding the increase in livestock-raising in Minnesota, there will be surplus hay for sale. The best crop of corn in the history of the state is being harvested. The small grain crop is not quite up to the usual standard, though the prices are good and the net profit to the farmer

from grain-raising is this year as great as it would be during the average year.

Progress in Agricultural Production.

Minnesota has long been known as a grain-raising state. During the past decade a gradual transformation has been made from grain-raising to livestock-raising. Crops have been diversified and many of the grain fields are now broken up in pastures and cornfields. The most marked progress during the past year has been the increase in acreage of alfalfa grown and in the production of corn. From an acreage of 2000 to 5000 acres of alfalfa a year ago, we have an estimated acreage this year of 25,000 acres, and the reports from all sections of the state indicate a splendid stand and the probability that this crop will succeed as well as have clovers and timothy succeeded in the past. The inoculated fields especially are showing up well and the knowledge gained in the method of handling the crop will be a great factor in increasing the acreage even more rapidly in the future. This rapid spread of alfalfa is due to the organization of extensive work in agriculture and to the efforts of county agents in many parts of the state. While 25,000 acres is a small area in a state containing 54 million acres, 70 percent of which is at present tillable, it marks an increase of 400 percent in alfalfa-growing in Minnesota and the interest in the crop is in proportion to the increase.

The impetus of alfalfa-growing is almost paralleled in the production of corn. While the percent of increase is not so great between last year and the present year, the increase during the past decade is decidedly large. Upon a 2 million acreage last year we secured a yield of 40 bushels per acre. It is estimated that here is an acreage of 2,600,000 this year, and that the crop is as good or better than last year. One hundred and fifteen to 125 million bushels of corn should be harvested in Minnesota this year from the present indications. The increase of two such crops as alfalfa and corn can hardly fail to imply an increase in the production of livestock. While the statistics are not available at the present time for this year's production, the interest in livestock and the agitation given to livestock raising indicate a growth in this direction. Dairying, always a strong industry in Minnesota, has made material growth. Swine-raising and beef cattle feeding have received more attention during the past year than has been given at any time during the past decade. These branches of livestock raising are bound to increase where the acreage of alfalfa and corn are increasing and where climatic and soil conditions are so favorable to the production of forage crops as they are in Minnesota.

Progress in Better Living for Rural People.

It is not enough that progress is made in agricultural production. The object of greater agricultural production is better living for the rural people who live in the open country. In this direction Minnesota has made a greater progress than in the matter of agricultural production. Better living in the country follows better education of the people. That the people from the farms are demanding better education is indicated in

the substantial increase in attendance at the Agricultural College and in the schools of agriculture, of which there are three. There is an increased interest in agricultural education also in rural localities as indicated by the number of institutions which are giving instruction in agriculture in their courses. One hundred thirty-eight of the high schools of Minnesota are now giving courses in agriculture and home economics. The instruction in all of these schools is given by a properly trained and qualified agriculturist, one who has received his own training in some of the agricultural colleges of the United States. As a consequence of this training and education, instruction in the agricultural branches is much more favorably received by the farmers and they are inclined to accept assistance from the high school instructors in agriculture who give considerable time to extension work in the localities.

In addition to the regular instruction in the institutions organized for educational purposes, farmers of Minnesota are demanding and receiving education on the farms. The extension work of the College of Agriculture and Experiment Station reaches all parts of the state. In addition to the assistance given from the central institution, twenty-seven out of the eighty-two counties have organized for the support of county agents. These county agents live at central locations and give their entire time to the attempt to build up agriculture and rural life in the county. They deal with the farmers on their own farms, assisting them in the organization of their farms for efficient production and give assistance in business matters generally. The aim is to increase the business efficiency of the farmer and to make him a more skilful farm manager. Supplementing the county agent work, twenty-eight demonstration farms are supervised. On these farms the farmer receives his instructions and plans for work from the demonstration farm supervisor in an effort to improve the business methods of the farm. The farmer pays his own bills, hires or performs his own labor, and meets all the expense of operation. No charge is made for the supervision nor is the farmer subsidized in any way.

Through greater agricultural production and better knowledge of the problems of the farm, and through better organization of the farm business, great gains have been made in Minnesota the past year. These gains, however, we expect to make only the foundation for still greater agricultural prosperity in future years. We still have much land to develop. We have many improvements to make in methods of farming and much higher standards of living to reach.

We believe, however, that Minnesota offers some of the richest opportunities for correct living upon the farms, and invite you to inspect and corroborate these statements for yourselves.

DEAN JARDINE:

Is Dean F. B. Mumford here to make a report for Missouri? If not, in the absence of F. B. Linfield, Professor Atkinson, agronomist with the Montana Experiment Station, will make the report for Montana.

Montana

PROFESSOR ATKINSON:

I am just as sorry as you are that Dean Linfield is not here, but he could not come.

Montana is still on the map with her agriculture. The Dry-Farming Congress was there about five years ago, but at that time dry-farming had not progressed so far as it has at this time. There is still some irrigation for those who are coming now. The state has 93 million acres of land and 30 million acres of that is devoted to farming. We do not speak of Montana's dry agriculture alone, but also of Montana's irrigated land. We estimate we will have 10 million acres also irrigated.

It has been demonstrated we can grow wheat. The United States government gives us an average of 26 bushels to the acre for wheat. We can grow oats, barley, and alfalfa and all those crops. The Montana farmers have been impressed with the things Dean Jardine brought out and so the question of dry-land possibilities in the non-irrigated land is now receiving much attention in Montana. At the experiment station, we are frequently asked the question, "What can we do for dry-land farming?" and a good deal is being done in Montana to help out along those lines. We are doing much with pit silos.

Five years ago, I believe there were about 20 head of swine entered at the state fair, yet this year 700 head were entered, suggesting the change that has come. The method we follow there is to grow early-maturing grains and grow our hogs along through the summer on alfalfa. That is a common procedure there. Then, with the good food that is supplied by the pit silos, livestock is coming to have an important place.

We are afflicted with freight rates out there. Everything is high and it is all due to the freight rates. With a 60-cent wheat, due largely to the difference in the freight rate, there was not much profit and so the farmers are turning to the livestock business. But we are coming into a new era of farming and our agriculture is taking to permanent farming on a permanent basis and of course, we will get other things.

We have a good school system, and we are even getting woman suffrage. I thank you.

DEAN JARDINE:

E. A. Bennett, Dean of the College of Agriculture of Nebraska, will tell us something about the progress of agriculture that has been made in Nebraska this year. Is Dean Burnett not here? He has not yet arrived. Then Doctor E. P. Humbert of the Experiment Station of New Mexico will report for that state if present. Doctor Humbert.

New Mexico

DOCTOR HUMBERT:

I very much doubt my ability to impress you much about New Mexico following the great stories you have heard. I am reminded of the rather green-looking fellow who came in the sleepingcar and sat down next three

travelingmen. The men thought to impress him, so one of them told a story about the big corn in Kansas, then another one told a wheat story, and the third man told about the cucumbers. The green-looking fellow sized them up and then said: "Well, I know why in the Bible it says that Ananias came fo(u)rth. You gentlemen came first, second and third!" I have been preceded by Mr. McOmie, Dean Jardine, and Mr. Atkinson!

I will not take even the full five minutes, I think. I would very much rather talk about New Mexico over at the booth in the Interstate Building where we have something of an exhibit, due largely, to the aid received from the United States Department of Agriculture in gathering the exhibit. Those of you who come to the booth and talk to myself or Mr. Curless, I will know I am talking to the people who wish to hear about New Mexico. Our exhibit there is from the dry-farming region only.

New Mexico is the fourth state in size in the union, but perhaps something less than one-quarter of it is available for dry-farming to some degree. Being the Dry-Farming Congress, we have explored that section of the state for an exhibit, and have not visited the Pecos Valley or the pumping district about Deming or the irrigated section in San Juan County.

We grow other crops besides the ones we are exhibiting. In the section down there, I think you will agree we have perhaps the best alfalfa that is grown anywhere in the United States. We have no derricks and we can bale alfalfa from the shocks in the field and put it immediately under cover.

Now, we are all of us working together down there to help the settler on the dry farm. We have several agents. The Santa Fe Railroad has Mr. Bainer, with whom you are all acquainted, as he has attended these meetings in the past. The El Paso and Rock Island lines have Mr. Trumbull, who is present this afternoon, thoroughly familiar with the dry-farming possibilities in the state, men who can talk to you more authoritatively than I because I have been there only three years.

The Agricultural College, of course, reaches as many as possible. We are doing more and more toward helping the dry-farming make a success and a permanent home. The United States Department of Agriculture has given us a station at Tucumcari. We are all working toward the same purpose—that is to make a permanent home, something besides a one-crop system, which has to some extent demoralized the work, has demonstrated for instance one of the examples which I might bring out, through that region it takes about 5 acres of land to keep a steer a year. Last one of the men demonstrated that on 1½ acres, he could grow sufficient material to keep the steer a year.

Let me impress upon you that it is not getting rid of the stock but getting rid of a lazier method of stockraising, because we will have more stock under dry-farming methods than we will have without it. Now we are telling people that they cannot afford to ship water out of the state, with high freight rates, in the form of forage, and the biggest problem of dry-farming is the marketing side, and the railroads's agricultural men

are encouraging that just as much as the rest of us, because the thing the railroad is interested in is a permanent crop of homes along its line.

I have not used my case in making these remarks as a chairman of a political meeting, who was called upon to present a speaker at the evening meeting. He said: "Ladies and gentlemen, I have the great pleasure of introducing Liberty Hyde Bailey, who will give us an address on Rural Betterment, but before calling on Mr. Bailey, I wish to call on the Reverend Mr. Smith, who will invoke the blessings of Almighty God!" I thank you.

DEAN JARDINE:

We will now hear from North Dakota, a good state to follow New Mexico. J. H. Sheppard is scheduled for this report. Is he here? Well, I know a man from North Dakota who can make a splendid talk. Doctor Worst.

North Dakota

DOCTOR WORST:

The other men and one woman have used the time so well that I do not have a single personal regret for the time they took.

The difference between North Dakota and New Mexico, in fact, its dry-farming problem, varies with different climatic and soil conditions. The two things that seem the most adverse to North Dakota, I consider her greatest blessings. First, we have long winters. For about five months in the year we lose no moisture and consequently we are perhaps in better condition to withstand drought than they are in New Mexico, or even here in Wichita. Another thing is the fact that we have a limited rainfall. I consider too much water just as bad as too little.

We are trying to teach the people in North Dakota that the cow occupies the central position in this great problem of moisture conservation, because in order to keep a cow on the farm we must cultivate a certain part of the farm every year to corn or other crops, and feeding these to the cow, she returns to the farmer about \$19 worth of manure, which, applied to the soil, not only retards evaporation, but a plant will come to maturity on a little more than one-half as much water. There is a given amount of fertilizer that comes from the soil to mature the plant. Now, if the soil water is held through that fertilizer, why the plant needs to bring in that much less. It is not the quantity of water the plant wants, but what the water, combined with the plant, brings into it.

We plow deep so we can conserve the moisture. We have learned that from the time the seed germinates until the harvest is ready, the growing plants, except kafir, will wait for it to rain, but wheat and corn must have sufficient time from the time the seed germinates until the harvest is ready, and if the drought should be prolonged for ten days or two weeks the crop is absolutely ruined. The whole system is to have a reserve of moisture in the soil so that when the clouds fail to give it up, the soil must have it. As it is, we take desperate chances as farmers on that very thing, because it is the constant percentage of moisture in the soil all the

time that determines the size of the crop. That is the one thing we give over to chance absolutely—the one thing to which we should pay the most attention. With livestock, we can maintain the fertility of the soil for there is no soil that you can take from all the time and give nothing back that will produce good crops.

Another great thing we have to pay attention to is to the destruction of weeds, for I believe in North Dakota I can safely say that farmers lose not less than 50 million dollars on account of weeds. Not only do they rob the ground of fertility, but they steal the moisture from the plant that needs it and get what they want, and what they have no use for, the plants get. The pig will get in with all four feet and the weed is a kind of a pig so far as the moisture is concerned. I have taken my ten minutes, but I believe that is one thing we should pay attention to in a Dry-Farming Congress of this kind, yet after all it is a few plain, common-sense things that the average farmer understands well if we could only get him to do them, that really counts. Instead of farming so much at a loss, farm one-half as much and farm it twice as well. An old fellow had 1200 acres of land and three daughters, and he decided he would farm this land until the first daughter was married, then he would give her one-fourth of it. The first daughter married and he gave her three hundred acres and then he farmed only 900 acres, and he said he made just as much money as he did before. Then the second daughter was married and he gave her her share, and only farmed 600 acres, and he made just as much money as before. Finally, the third daughter was married and he gave her 300 acres, which left him only 300 to farm, and he found he made just as much money as he did when he tried to farm the entire 1200 acres! It is all a matter of intelligent work we put on the soil with a view to conservation, and to kill the weeds that steal the moisture and then, sir, you will find that the regions that are deserts today will produce abundantly and the beautiful homes of the future will come out of the deserts of the present.

DEAN JARDINE:

We will now hear from Oklahoma. Is Mr. L. L. Lewis, director of the Oklahoma Experiment Station, present to report? If Oklahoma is not ready to make a report, we will go to Oregon and have Mr. H. D. Scudder, in charge of dry-farming land in that state, make the report.

Note: By oversight Mr. Scudder's remarks were not taken by the reporter nor manuscript received at the time the Proceedings went to press.

DEAN JARDINE:

We will now hear from South Dakota. Dr. A. N. Hume.

South Dakota

DOCTOR HUME:

I might be like President Worst of North Dakota—stay down there and it would probably be just as good a scheme; but the idea is that I want to see you, like the man who had 15 children and brought them all

in to see the moose. It is just as important that my moose see your children as that your children see my moose.

I am glad to be here from South Dakota. We have an exhibit down at the Forum also, although we did not bring nearly everything we could. The fact is we knew Kansas could not hold us if we did, but we brought legumes and alfalfas. We know that we must in South Dakota produce legumes to get the nitrogen that legumes are capable of getting out of the air. Near Aberdeen is a soil which had in it over 6,000 pounds of nitrogen; and right beside it a soil cropped, with less than 5,000 pounds of nitrogen, a loss of something like 1500 pounds, or a loss in 27 years of over 24 per cent, nearly a loss of 1 per cent of the nitrogen per year.

Now South Dakota soils are fertile. That is not uncommon in the state of South Dakota. The great question with us is the problem of the supply of plant food and also the supply of humus that must be in our soils and that we know our present system of farming is depleting, so we are looking ahead in South Dakota, and we were looking ahead when we came down with an exhibit which was representative of one of our problems in South Dakota.

We raise corn and cane in South Dakota. We raised 72 million bushels of corn in 1912, but South Dakota is not a corn state any more than South Dakota is a wheat state; but corn and wheat and legumes, alfalfa and alfalfa and alfalfa, and still more important, clover, sweet clover, you will see at the exhibit down at the Forum. Some people ask me, "Is sweet clover equally as good as alfalfa, or is it better than alfalfa?" and I always say that both of them are better!

We are thinking ahead in South Dakota for the people we have and the people we are going to have. You see the human element sort of creeps in.

I bring you greetings from three-quarters of the people who live in South Dakota. I am thinking of the people who live on the farms of the state from which I am proud to come. There are some farmers here, are there not? I thought so; and those are the people we bring greetings from.

DEAN JARDINE:

We will next hear from Utah. Doctor John A. Widtsoe is scheduled to make this report but I believe he is not present. Doctor Robert Stewart will make the report if he is present. If not, there is a man here from Utah who is the pioneer of dry-farming in the state of Utah, who was connected with the Experiment Station and Agricultural College for a number of years, and I am sure he will speak for the state of Utah for just a moment, Lewis A. Merrill.

Utah

MR. MERRILL:

Mr. Chairman, Ladies and Gentlemen: I certainly am a very young man to be a pioneer, but I am proud to represent the state of Utah as the

pioneer irrigation state, and we claim it to be the pioneer dry-farming state. I wish to convey the sincere regrets of Doctor Widtsoe on his inability to attend, due to illness in his family.

Away back in 1847, when the pioneers blazed their way across these prairies and located in the sagebrush of Utah, they began the work of taking the streams from the mountains and putting the water on the land. They are the first people in modern times successfully to have practiced irrigation. An insufficient water supply was found in some sections and some of the farmers found to their dismay that they would have to get along without irrigation at all and so they began dry-farming. To the surprise and astonishment of those people, the crops grew and thrived and succeeded and for many years thereafter they cultivated those mountain sides; and Major Powell in 1863, reports he found splendid fields of grain grown by dry-farming. We have had, during the past year, magnificent examples of cultivation of soil by dry-farming methods. Never before have we had such splendid methods of farming, and for this we give credit to this organization, the Dry-Farming Congress, which we had the pleasure of entertaining some years ago at Salt Lake City.

It is useless, of course, to plant wheat on the desert unless we can take care of that wheat. Our great problem has been to get the farmers to utilize the wheat land to better advantage. You will realize we are very close to that splendid growing section of Southern California, a section of the country that is growing more rapidly than any section of the United States today, and so our efforts are being made to get the farmers to raise the beef steers, hogs, etc., and I can say we have had marked success along these lines during the past few years.

The state maintains in Utah a number of experiment farms located in different sections conducted in cooperation with the United States Department of Agriculture. The one at Nephi is well known; in fact, the fame of that station is worldwide. It had a great deal to do with the permanent success of dry-farming efforts throughout the West. The annual precipitation at Nephi is about 14 inches, and I was glad to see exhibits of the farmer who lives within two miles of our station. The average yield was 67 1-5 bushels per acre. Of course, the precipitation factor is only one of the factors. I take it the question of evaporation is as great a question. Then there is the factor of soils—how will the soil retain the moisture, etc.

I might say just a word in addition with relation to the lands where the precipitation is less than 10 inches, soils deep, rich and fertile, located on the coast, where the climate is ideal, but yet so far have not been cultivated. Underlying a large acreage, we have a large body of water, varying in depth from 20 to 50 and 70 feet. The state has undertaken the work of developing this land and as a result of this farming, we have had located in this valley more than 350 families during the past six months.

I believe in the work of this Congress—I believe in the reclamation of the desert—I believe in the establishment of homes for the multitude of people who are bound to come to us from Europe. We had hoped, in the Southwest, that with the opening of the Panama-Pacific Exposition next

year, we would have a great many people coming to us from European countries; but when the war is over there is no question that thousands of homeseekers will look to America where they can find a home, and when that time comes, we want to have our land in such a condition in this Western country that the people from those countries will come and join us in this splendid land.

SECRETARY FAXON:

Mr. President: At the suggestion of Mr. McOmie, chairman of the Membership Committee, I want to read again the names of the members of that committee, and then Mr. McOmie, I think, wants to fix a meeting place and time. The members are: A. M. McOmie, Arizona; E. P. Humbert, New Mexico; W. C. Edwards, Kansas; M. F. Greeley, Minnesota; Thomas Knight, Missouri; Lewis A. Merrill, Utah; Axel Axelson, Colorado; A. F. Mantle, Canada; Manley Champlin, South Dakota; H. M. Bainer, Texas. It is no more than right, of course, that the many visitors who are coming to the sessions of this Congress should be solicited. Mr. McOmie, Mr. President, may have a suggestion as to the meeting time and place. Mr. McOmie suggests that a luncheon engagement might be arranged for tomorrow noon, if that be satisfactory to the other members of the committee. Suppose this arrangement be made and the members meet tomorrow at the Wichita Club. Mr. President, I also want to mention the fact that Mrs. East and others of Colorado would like to have an early meeting of the Colorado members, for the purpose of picking out their committeemen, etc. One other matter that is in connection with the Exposition also, I wish to mention. A good many appear to feel that the Congress badge admits them to the Exposition. That is not correct. In connection with the Exposition, in the past, the admission fee has generally been 50 cents. In this event and in this wonderful Exposition, which is a part of this Congress, of course, the admission fee was fixed at 25 cents at the beginning, and for this reason the badge does not admit to the Exposition, and I think most of you will see the force of my suggestions.

DEAN JARDINE:

We will now hear from Wyoming. Mr. A. E. Bowman will make the report.

Wyoming

MR. BOWMAN:

I was not aware when I arrived in town that President Duniway would not be here, but in his absence I will endeavor to say just a few brief things in regard to Wyoming.

I believe Wyoming is the Queen of the West and possibly of all states, when it comes to horseback farming. Wyoming is just in its infancy in regard to farming. Wyoming has been handicapped in a great many ways in regard to her agriculture. First, by the altitude: The average altitude of Wyoming is higher than that of any other state. She has the reputa-

tion of having the highest experiment station, or rather an experiment station at a higher elevation, in the world. Most of our experiments give us a negative result. We do not try to get positive results, but we try, in a way, to prove what must not be done at a certain altitude and we are able to tell our people what not to do.

We have been experimenting and trying to increase the resistance to altitude at some of the farms and have succeeded fairly well.

Another drawback has been the attitude of the horseback farmers or the cattlemen. The cattlemen have maintained that Wyoming cannot, and will not be a farming state. They have been in control of the machinery of the state and have been able to keep out men who have been seeking homes and who have been endeavoring to make a home. But gradually people are coming into the state and proving they can grow crops and make a good living.

As a result of the survey that was made in Laramie County where many people said the farmers were starving, they were, it was demonstrated, making a good living. In fact, some of the farmers were averaging \$1500 as an indication of a handsome income.

We need more people. Wyoming is a big state but small in population, but the people who are coming in are demonstrating that Wyoming will be an agricultural state.

In the northern part, we can grow almost any crop. We are able to grow watermelons, peas, tomatoes, and in some instances sweet potatoes. A year ago we had a fine exhibit of products from the Big Horn Basin. The university and college have been handicapped by lack of funds to carry on experiment work, and it has been due to the factors I have just mentioned that the cattle kings have been very zealous in their efforts to keep out people who wanted to make homes in Wyoming, and so the college people have had no money to encourage the farmers. However, since the passage of the Smith-Lever Act, we have been able to carry on the work to better advantage and we are endeavoring to help the farmers.

We find our soil is poor in organic matter and we have been teaching the farmers to use sweet clover and it is proving an excellent crop. Alfalfa is proving a great crop in Wyoming, and during the past two years, we have shipped out thousands and thousands of cars of alfalfa.

We are trying to teach the people to get into stockraising. We have a section up in the Powell district under the Government Reclamation service occupied by a very distinguished body of people—there were not a dozen farmers on that whole community, there were lawyers, college men, etc., and they are making a great success, but they cannot do it all. We are trying to get those people to buy a cow, or a pig, or an animal of some kind, to build up a livestock industry; and although Wyoming is a great livestock state, yet the cattle kings have not learned to use the crops grown there. So we hope, by our efforts in the future, to help the farmer realize the necessity of feeding what they raise. We are also helping to encourage all schools in agriculture. We have a law requiring all public schools to

teach agriculture, which is an advance, we hope, and will bring handsome results.

We are optimistic of the future of Wyoming's agriculture. In a recent conversation with a representative of the Department of Agriculture, which is working in dairy demonstrations, he stated that he had never seen a country whose prospects for dairying were greater than those of northern Wyoming. I thank you.

DEAN JARDINE:

We have with us this afternoon Doctor Joseph L. McBrien, Specialist in Rural Education for the United States Bureau of Education, whom we had expected would appear later in the sessions, but who is compelled to leave the city soon. He has been given a place on the program this afternoon in order that we may not miss the message I am sure he has for us.

DOCTOR M'BRIEN:

Mr. Chairman, Members of the Congress: I have been greatly interested in the story of material things. I like to see the prosperity of the farmer in crops and in animals, but I come now to speak for the greatest products of the farms, the boys and the girls.

I very much regret that Doctor Claxton could not accept your invitation to speak before you. He would have enjoyed it, and so would you. He was a backwoods mountain boy who knows what farm life is. But above all, he is interested in the rural schools.

I regret that my coworker, named on the program for tomorrow afternoon, could not come and give you his paper. While it is a pleasure for me to be with you, I am laboring under some difficulties, for I was requested to come on short notice and filled three engagements for Mr. Foght on the way, and by the kindness of your officials, you allow me to appear on your program at this time in order that I may leave tonight for Saint Johnsbury, Vermont. I want your attention for just a little while on the rural schools.

Address of Doctor McBrien.

SOME PROBLEMS IN RURAL EDUCATION.

The first problem for consideration in rural education is that of funds with which to maintain schools in such a manner as to give the farm boy and farm girl equal opportunity in their preparation for life with the city boy and city girl. In every letter of the words "educational opportunity" the city boy and girl have privileges far superior to those of the farm boy and girl. In funds, in length of term, in equipment, in buildings and grounds, in administration and supervision, in course of study, in efficiency of the teaching force, and in salaries paid, the superiority of the city schools is so far above that of the rural schools as to make the situation pitiful. It has been so desperate in many sections of the country for the past fifteen years, when contrasted with the splendid opportunities of the city school, that it is given more times than any other reason by fathers and mothers for moving from the farm to the city.

Within the heart of every honest parent there awakes with his first babe's first cry the noble wish to give his child a better bringing-up than his has been. Consider the opportunities for such a laudable ambition under a system of city schools like that of Wichita—second to none in the United States—and like that in hundreds of other cities and towns of Kansas, and weigh also the lack of such advantages in hundreds of weak rural school districts in this state, and you will discover the principal cause for the rush from the country to the city during the past two decades, not only in Kansas, but in all the states, north, south, east and west; for, what is true in Kansas is practically true of every other state.

The country school of today is not in its interest to pupils what it was twenty-five to forty years ago. A generation ago, young men and young women attended the country school. There was a sufficient number of pupils brought together to create interest in the work of the school, in its plays and games and in the community activities through the school. The spelling bees, the ciphering matches, the writing schools, the singing schools, and the school exhibitions may have been old-fashioned, but they were the chief features of entertainment for old and young, and they were considerable means of instruction for both. A generation ago, nearly half of the schools in the rural schools were men. With all due respect and credit for the work the women teachers are doing in the rural schools today, I am persuaded—and I believe the women will agree with me—that the loss of men teachers from the rural schools is one of the greatest calamities that has ever come to the rural schools.

Today there are hundreds of rural schools in Kansas, and in each of the other states, with an average daily attendance of five or less; and, if you make the average daily attendance from five to ten, the rural school districts in Kansas, and in a great majority of the other states, will be numbered by the thousand. In thousands of rural schools in nearly every state of the Union, there are not a sufficient number of pupils brought together to create interest in either work or play.

The number of juvenile recruits who are permitted to enter upon the responsible work of teaching in the rural schools of the United States each year—with only an eighth grade rural school education, and in several states, only a seventh grade rural school education, obtained under teachers with no better equalifications than their own—with no professional training—is at least twenty-five thousand. Nearly one-third of the rural teachers of the United States have little or no professional training.

On the other hand, the growth of the city school—and especially the American high school—is the marvel of the age. It has had funds for its needs. It has learned the value of efficiency in its business administration and of expert supervision of professionally trained teachers. It has modernized its courses of study. Everything that money could provide and human genius devise for its improvement has been given freely and lavishly; for it could tax banks, and stores, and real estate, and great railways, including their terminals, and often at a much higher legal rate of taxation than was permitted in the rural school districts. No wonder that,

with such matchless opportunities for school privileges in the city, with the rural school almost forgotten, the farmers moved from country to city.

But do not misunderstand me. I am an optimist. This marvelous growth of the city school was inevitable. The people wanted it and it had to come. It was an essential factor in our economic evolution, and I am confident it will ultimately be for the common good of both country and city. For we must ruralize the city and urbanize the country. Neither can get along without the other. We must have both.

In order for the rural school to be what it should be, it must have more money. To have more money, it must have a larger taxing unit. There are independent rural school districts in the sandhills of Nebraska that vote the limit of taxation—thirty-five mills on each dollar of assessed valuation—which does not produce sufficient funds for three months of school. For such districts the legislature of that state appropriates about \$50,000 annually—\$100,000 for the biennium—toward giving a minimum of seven months of school for each year. There are several other states that appropriate state aid for their weak rural schools. This is good as far as it goes, but it does not go far enough. There are some rural school districts in Nebraska which, under the state apportionment of the public school funds, have not voted any local school tax for years, and yet have had nine months of school with a good teacher who received \$50.00 or more salary per month. I know that it is impossible—except in theory—to provide equal opportunities for all under equal burdens of taxation; but, there are some inequalities in taxation for rural schools in many states where a more nearly equitable system of taxation is possible.

The United States Bureau of Education, in a recent official letter, suggests the county as the unit of taxation and administration in school matters, except that independent city districts employing a city superintendent would not be included. This plan works well in some of the Southern states, especially in Louisiana, Maryland and Tennessee. New England holds to the town as a unit in these matters; that is, the township, as we understand the term in the west. Indiana is making a success of the township as the unit of taxation and administration for school purposes, while Illinois, Iowa, Minnesota and Nebraska are types of the independent district system—ultra home rule—absolute democracy in rural education.

The consolidation of four or five weak rural school districts into one strong centralized school, with the transportation of pupils at public expense, is almost impossible under the independent district system, though Iowa and Minnesota are trying to superinduce consolidation of their weak rural schools by a state subsidy and are making good progress. But, the only states making marked progress in consolidation are those having the county or township unit in taxation and administration, with the single exception of New York State, which has already passed a rural school consolidation law, giving its administrative school officers almost unlimited power. Dr. Finnigan, of the New York State Department of Education, predicts that within five years practically all of the weak rural schools of that state will be consolidated into strong, centralized schools.

It may not be out of place briefly to summarize the benefits and advantages of consolidation here: (1) The pupils enjoy and profit by that interest and enthusiasm and confidence which numbers always bring; (2) pupils can be better classified and graded; (3) tardiness and irregular attendance are reduced to the minimum; (4) no quarreling, improper conduct or improper language, so common among children on their way to school; (5) no wet feet or wet clothing, nor colds resulting therefrom; (6) pupils have the advantage of better schoolrooms, better lighted, better heated, better ventilated; (7) it makes possible a modern course of study, including agriculture, manual training and home economics; (8) this plan will result in better teachers, better paid; (9) it will provide through its school building an assembly room for the community meetings and school entertainments, thus making the schoolhouse a civic and social center that will give rural life the best things of the city without the city's temptations.

The consolidation of the rural schools makes possible the readjustment of their courses, as to give the farmers and farmers's wives of the future the kind of education necessary to fit them for the actual duties of everyday life as American citizens.

On this problem of the rural schools, permit me to quote the United States Commissioner of Education. He declares:

"The farmer and the farmer's wife who live on and by their farm need a higher, deeper, broader, more varied and more fundamental education than men and women engaged in any other occupation. The most important question of citizenship in these United States is the improvement of the public schools for the better and fuller education of the boys and girls of the country. The most difficult and pressing phases of this important problem consist in the readjustment of the content of the courses of study on the basis of what the men and women in the country need to know and in putting into the schools and keeping there teachers prepared to teach these things skilfully and well."

No one has pointed out more forcefully the great mistake in American education, especially as concerns the rural school, than President Roosevelt did in his address at the meeting of the Department of Superintendence of the National Education Association held at Washington in February, 1908. He said:

"In the first place I trust that more and more of our people will see to it that the schools train toward and not away from the farm and workshop. We have spoken a great deal about the dignity of labor in this country, but we have not acted up to our spoken words, for in our education we have tended to proceed upon the assumption that the educated man was to be educated away from and not toward labor. The great nations of mediaeval times who left such marvelous works of architecture and art behind them were able to do so because they educated alike the brain and hand of the craftsman. We, too, in our turn, must show that we understand the law which decrees that a people which loses physical address invariably deteriorates, so that our people shall understand that the

good carpenter, the good blacksmith, the good mechanic, the good farmer, really do fill the most important positions in our land, and that it is an evil thing for them and for the nation to have their sons and daughters forsake the work which, if well and efficiently performed, means more than any other work for our people as a whole. One thing that I would like to have you teach your pupils is that whether you call the money gained salary or wages does not make any real difference, and that if by working hard with your hands you get more than if you work with your head only, it does not atone for it to call the smaller amount salary.

"I would not have you preach an impossible ideal; for if you preach an ideal that is impossible you tend to make your pupils believe that no ideals are possible and, therefore, you tend to do them the worst of wrongs—to teach them to divorce preaching from practice, to divorce the ideal that they in the abstract admire from the practical good after which they strive. Teach the boy and girl that their business is to earn their own livelihood. Teach the boy that he is to be the homemaker; the girl that she must ultimately be the homekeeper; that the work of the father is to be the bread winner, and that of the mother the housekeeper; that their work is the most important work by far in all the land; that the work of the statesman, the writer, the captain of industry and all the rest is conditioned first upon the work that finds its expression in the family, that supports the family. So teach the boy that he is expected to earn his own livelihood; that it is a shame and a scandal for him not to be self-dependent, not to be able to hold his own in the rough work of actual life; teach the girl that so far from its being her duty to try to avoid all labor, ail effort, it should be a matter of pride to her to be as good a housewife as her mother was before her."

From the beginning we have had two schools in our educational system just as we have had in our political system—the School of Conservatism and the School of Innovation. Emerson tells us that these two schools which divide the state are very old, and have disputed the possession of the world ever since it was made; that this quarrel is the subject of civil history; that it agitates every man's bosom with opposing advantages every hour; that it may be safely affirmed of these two metaphysical antagonists, that each is a good half, but an impossible whole; and that each exposes the other, but, in a true society, in a true man, in true progress, both must combine.

There are still some good people who think that any kind of manual labor is degrading; who by some kind of false logic have convinced themselves that selling farm and garden products is much more dignified employment than growing them, or that standing behind a counter measuring off tape and calico is more refined and elevated work than standing behind a loom weaving them. According to Horace Mann it is every way creditable to handle the yardstick and measure tape; the only discredit comes in having a soul whose range of thought is as short as the stick and as narrow as the tape, and the Carnegie Survey, of Vermont, was right when it said that there was something radically wrong in a school system in an

agricultural community that turns out only stenographers, typewriters, clerks, bookkeepers, motormen and engineers.

There are still many good people who believe strongly in the old order of things and who say, "Let well-enough alone." But this motto never made a single step in progress. "Make well-enough still better" is the motto for every school-boy and school-girl to write in the copy-books. It is the awakened desire of the rural people manifest everywhere—North, South, East, and West, to make their schools better that marks the real progress in rural education at the present time.

The average education of the American citizen in 1800, according to Dr. E. A. Ross of the University of Wisconsin, was only 80 days; in 1900, according to the Bureau of Education, it was less than six years of 200 days in each year. It is now 1,057 days—still less than six years. Not until the average education of the rural American has reached 12 years—education fitted to his life and that prepares him for his duties as a citizen,—can we boast of our progress in rural education.

But farm boys and farm girls who are industrious enough to secure such an education as this will be too industrious and ambitious to stay on the farm, unless they are taught how to provide the farm home with some of the modern conveniences of the city home. The telephone, the free rural delivery of mail, and the automobile have done much for thousands of farm homes, but isolation, lonesomeness and drudgery are still the lot of many thousands of farmers's wives. President Waters and myself can testify to the drudgery we have witnessed as the lot of some farmers's wives in the Ozark Mountains, who, on washday, carried a pail of water in each hand and a piggin of water on their heads to the washing place, sometimes a quarter of a mile or more in distance. This was some years ago, it is true; but, only last December, in company with a state farm demonstration agent, he told me that within seven miles of the capital of one of the Southern states there were several farmers living with the third wife. I asked if the divorce evil was the cause. He replied that it was over-work, neglect and excessive child-bearing that had taken off in untimely deaths the first and second wife. Only this summer, a vice-president of one of the State normal schools of Illinois stated publicly in my presence that larger percent of farmers's wives are in the asylums of that state than any other class of women. I do not mean this as a criticism of my sex, except where it should apply. I consider it my duty with my knowledge of the situation to raise my voice in behalf of the long-neglected and much over-worked farmers's wives.

You may ask what this has to do with rural school problems. It has just this much to do with it: Every rural child has the right to be well-born, to have a mother who is in proper physical and mental condition during its pre-natal period, as well as during the years of its home training under its mother. A condition precedent to better rural schools is better-born and better-trained rural children.

The greatest of all factors in the proper solution of the problems in rural education is the teacher. As is the teacher, so is the school. The

teacher means more than funds, building and grounds, more than consolidation and county unit, more than courses of study and boards of education and expert supervision. Rural school and rural life problems call for men and women with the zeal of the crusader and the spirit of the missionary to solve these problems; for, it will take the enthusiasm of the crusader and the consecration of the missionary to work among and become one of our rural people in the isolated sections of our country.

No man has ever made a more logical and eloquent plea for professionally-trained teachers than J. Sterling Morton, Father of Arbor Day, and Secretary of Agriculture in President Cleveland's cabinet. The first national conference on teacher training for rural schools held in Chicago last month made his declaration on this question the platform for a nationwide campaign for better teachers for the rural schools of the United States. Mr. Morton said:

"We demand for Nebraska educated educators. We demand professionally trained teachers, men and women of irreproachable character and well tested abilities. We demand from our legislature laws raising the standard of the profession and exalting the office of the teacher. As the doctor of medicine or the practitioner of law is only admitted within the pale of his calling upon the production of his parchment or certificates, so the applicant for the position of instructor in our primary and other schools should be required by law first to produce his diploma, his authority to teach, from the normal schools.

"We call no uneducated quack or charlatan to perform surgery, upon the bodies of our children, lest they may be deformed, crippled and maimed physically all their lives. Let us take equal care that we entrust the development of the mental faculties to skilled instructors of magnanimous character that the mentalities of our children may not be mutilated, deformed and crippled to halt and limp through all the centuries of their never-ending lives. The deformed body will die, and be forever put out of sight under the ground, but a mind made monstrous by bad teaching dies not, but stalks forever among the ages, an immortal mockery of the divine image."

DEAN JARDINE:

This closes the regular part of the program for the afternoon. There are a few announcements to make, one, I believe, relative to the appointment of the members from the various states to the Committee on Resolutions and the Committee on Nominations. Every state is entitled to one member each on the Committees on Resolutions and Nominations. We would like to have these designated and handed in at this evening's meeting. Professor Atkinson of Montana wishes to get in touch with all Montana men who are here.

SECRETARY FAXON:

We have a treat in store for us Wednesday morning, which it might be well to remember—a little departure from the regular program, the pre-

sentation to the successful state winning, in the competition of 14 states, the magnificent silver trophy offered by the Chicago Association of Commerce.

I also wish to announce the following list of committees handed in.

LIST OF COMMITTEES

	Executive	Resolutions	Nominations
ARIZONA.....	A. M. McOmie	F. O. Allen	Andrew Kimball
ARKANSAS.....	E. W. Hopkins	Jay Kerr	
CALIFORNIA.....			
COLORADO.....	Charles A. Lory	Mrs. E. T. East	C. P. Gillett
IDAHO.....	E. J. Iddings	Robert Milliken	H. W. Wones
KANSAS.....	W. M. Jardine	Edwin Holton	Charles Dillon
MINNESOTA.....	T. A. Hoverstad	Mrs. Bigelow	M. F. Greeley
MONTANA.....	F. B. Linfield	A. Atkinson	
NEBRASKA.....	E. A. Burnett	E. A. Burnett	Arnold Martin
NEW MEXICO.....	E. P. Humbert	Burt Curless	E. S. Trumbull
NORTH DAKOTA.....	L. R. Waldron	Thomas P. Cooper	J. H. Worst
OKLAHOMA.....	W. I. Drummond	O. D. Hunt	C. C. Williams
OREGON.....	H. D. Scudder		
SOUTH DAKOTA.....	A. N. Hume		
TEXAS.....	H. M. Brainer	J. E. Lancaster	S. P. Cunningham
UTAH.....	L. A. Merrill	L. A. Merrill	Robert Stewart
WASHINGTON.....	E. A. Bryan	Henry Holtz	
WYOMING.....	A. E. Bowman	W. L. Quayle	W. L. Quayle
MISSOURI.....	F. L. Vandegrift	Jewell Mayes	Thomas Knight
CANADA.....	John Bracken	A. F. Mantle	E. R. Drake

DEAN JARDINE:

If there is no further business, you can consider yourselves adjourned.

MONDAY, OCTOBER 12

NIGHT SESSION

Governors Night

The Congress was called to order by President Waters, who introduced Governor Hodges, presiding officer.

GOVERNOR HODGES:

I am glad to welcome the delegates from foreign lands to participate in this great Congress. I am glad to welcome all others from other states to the great state of Kansas. Our friends coming from the East sleep for about ten hours before they reach the eastern boundaries of our great state so they may stay awake for about eighteen hours while they go from the eastern to the western boundaries of Kansas.

I love to speak of this great native state of mine, although I was born

in Wisconsin, but, like the Irish friend, we are proud of our native state, no matter whether we were born in it or not!

I now take pleasure in introducing to you my good personal friend, Governor Ammons, of the state of Colorado.

Colorado

GOVERNOR AMMONS:

Governor Hodges, Members of the Congress: At the morning session, Governor Hodges was kind enough to extend an invitation to me to come down in Kansas and live. Inasmuch as "Billy" Sunday is up in Colorado trying to drive the liquor out of that state, and my good friend and his associates in the Supreme Court of the United States, are trying to take our water away, I may take up that invitation and seek a thirst parlor in this state!

It was indeed a pleasure to come to this conference even for a short period, because it represents those things in which I have taken a personal part all my life. I am a ranchman and have been, in a humble way, caring for ranches in this Western country since I was 10 years old, all of it, however, in the state of Colorado. I have been through your Exposition and have witnessed there some of the finest agricultural exhibits I have ever seen in my life, and I believe the best one for its size I have ever seen.

I was interested in the portion of the program I had the opportunity of listening to this afternoon, where the experiences of some of the states were related. You know it struck me as being a splendid thing that these Western states particularly and countries similarly situated, should get together and engage in an experience meeting, if you please, pointing out their successes and giving to each other the advantages of the experiences of all. These conferences, this Congress if you please, has a great opportunity, not only for one or two or a dozen years, but for generations to come in the upbuilding of agriculture in these great expanses where we have learned but lately of all their advantages—and so it is a great pleasure to be here today.

I may say a few words for Colorado, but I want to say a few words first for the West. The West is still sparsely settled. Almost within my recollection it was described as a desert. We have made great progress but the progress we have made, the experience we have had, only point out more and more each year, not only the possibilities but the problems we must solve and these problems are largely the same, no matter where you go. What are some of these problems today? They are similar in Kansas, Colorado, New Mexico and the balance of the West. We need more money for development and more people—that is what we need. We have everything else. We have natural resources enough to supply tens and tens of millions where we have hundreds of thousands now. There is no end to them. So the two things we need are cooperation and labor and that is the reason we are maintaining and building up such expositions as you have here, just as they are going to have a splendid exposition in the Panama-Pacific Exposition next year. We need these two things and how to get them is the greatest problem we have today. If this Congress can

only do something, in a small way, to bring about these results, it will have accomplished a great deal indeed.

The first thing that is necessary to my mind is the cooperation we must have, a union of effort in these states. We cannot travel along, each one a separate road, not assisting the other and ever accomplish very much. The first thing we need therefore is to get together, to outline a program and then have all these Western states join hands and carry out the program, for, if they are united, we will be able to carry out almost any terms they may adopt. And so the Western Governors in their meeting a year ago at its second conference adopted a program for the West. They all united in it and this last year those who were there adopted the same program, adding some things that experience had pointed out. If our Congressional delegations should join hands on the same thing, it will be but a short time, with the tremendous power which they hold in the United States Senate and in Congress until we will be able to make more advance and do much more for the upbuilding of the West than we have been able to do in the past, and I want to urge the people here, representing all these countries, all these Western states—and I believe all the Western states are here represented—that this great problem of dry-farming is going to be the problem for the human race to solve if there would be ample food supplies for the future.

It has been but a few years since the livestock center of this country was back almost on the Atlantic Coast. It has been moving steadily Westward until it will soon be on the Missouri River and it may even go further West. People are talking about the high cost of living and what does it all mean? It means simply that our population has gone to the big cities and the manufacturing districts and that the farm population has not kept pace and the farm production has not kept pace with the growth of the population of this country. The United States census showed for the period of 1910 that the population increased 21 percent, while the population of the farming area increased but 4½ percent. Do you want any more lesson than that?

We have in the Rocky Mountain district power possibilities beyond comprehension. We have coal enough in the state in which I live to supply the entire world at the present rate of consumption for more than 300 years and the state just adjoining us to the north has 50 percent more than we have. We have, in our state alone, power possibilities enough to turn all the wheels of industry in this great empire, and there are states which have more than we. We have here, if we shall be able to master our agricultural conditions, good soil enough to increase our agricultural output so many times that I would be afraid to even make a guess as to how much it would be. These are the things we will have to handle and we will be able to handle them from these experience meetings, from such Congresses as this, and given the solution of that problem very soon in the future.

I wanted to say something of my own state. It seems to be fashionable in this conference for us to talk about our own states and I may be pardoned for doing so because I know more about that than any other, and,

as I have said, these problems which affect us also affect you. We have 3 million acres of land under irrigation. We have almost as much under cultivation without irrigation, and all of it we could take care of in a good deal better shape if we had the right knowledge and experience. This year we produced large fields of wheat in eastern Colorado without irrigation that yielded 40 bushels to the acre. That is good. We have many districts where the rainfall is a little more and where we have had more practice in handling the soils where almost every year there are good crops raised—almost as good, perhaps, as back in the regions of the East.

So we are interested in this dry-farming campaign. Some people have dared to deride dry-farming. I saw a man on the train yesterday and he pointed out the window and said, "What is that?" and I said, "That is an irrigation gate," and he said, "Is that what they call dry-farming?" He was a visitor. So you see everybody does not have the same idea of what dry-farming is. We are producing in Colorado crops on land ranging from 4,000 to 9,500 feet in altitude. We are irrigating orchards and we are raising fruit without irrigation. We are raising alfalfa with and without irrigation. We are finding throughout the state that there is something new we can do all the time, but the one thing we have learned out there is that if we are to succeed, we must have diversified crops.

We have the spectacle on the Western Slope of more fine fruit than we can sell and we cannot even pay freight on it to take it where people want it. There are thousands of tons of as fine fruit as I ever saw going to waste for the want of factories to take care of it. We have the power going to waste and there are people in this country who are looking for the food that those factories would take care of. This morning a good deal was said about the product of Kansas—how much you have raised. We buy some things from you. As a matter of fact, Colorado takes almost its entire output of silver and pays it out to these sister states on the east of us for livestock and foodstuffs and their agricultural products that we might raise ourselves if we had the people to do it.

No one of the Western states is absolutely independent of the others. You get our coal and we get your bread and ham. We are helping each other and I hope to see the time when the exchange will be greater.

Out in our state we feed more railroad facilities. We realize we must have population, as well as money, to build those roads in order that the roads may be maintained after they are built. We need wagon roads. We have roads that we can travel a little but the coming of the automobile has demonstrated that we must have better ones and greater highways. These great highways must be built through the gorges and the Western Governors asked for a donation of only 5 percent of the Western lands in order to build these great highways through the mountains, not only that we may use them in our business, but that you may use them. That is something where we are getting good and where we are going to accomplish a great deal of good for this Western country. It is a beautiful condition, when with a few hours's ride, you can go into those cool parks in the Rocky Mountains in the summer.

The cooperation of these Western states will bring all this about. You cannot produce your 8 million bushels of wheat in one county here or 200 million bushels in this state without helping us. We cannot produce our 20 or 30 millions of precious metals each year without helping you, and in the encouragement of one or the other, we are helping each other and helping both and so it matters not whether the production of that dollar's worth of wealth is in my state or in yours, it helps us all. In a great country like ours, everything we do to build up is helping us all.

Out in our state we have a population of less than a million. We have more natural resources to the square mile than has the state of Massachusetts. We are better located and yet if we were populated to the same extent as Massachusetts, we would have more than 40 million people. We find on investigations at home that only about 8 percent of the territory of Colorado has been developed at all and no percent is as developed as it should be.

Just think of the possibilities there are in this Western country! But the thing we have always lacked in the West has been the union of effort. That has been the trouble with us. We have had each state struggling along, something as rivals, and no two of them working absolutely in harmony for the upbuilding of this great Western empire of ours. We want these lands put in the hands of actual settlers and we want in our state to have them in the hands of actual settlers in such quantities that will enable each to make a living on a livestock basis.

This is a new country. Our state is only a little over three dozen years old. All of the institutions we have built have been constructed within that time, and what we must have is that all the property within that state, no matter what it is, shall be placed on the taxroll, and yet we have built, out there, 15 million dollars worth of state institutions, and today we have but little more than one-quarter of the property of the state on the taxroll.

We have learned one lesson from that, even in dry-farming, and that is that livestock must take some part of the settlement and development of that country. Out in western Colorado since the silo has come, they are becoming more prosperous—they are all making some money. In that country they were keeping hogs or cattle and selling their crops in the fall each year, and then they changed to the small farm basis and then they began dairying. There is more livestock in that county today than there was before the land was cut up and there is dairying on almost every farm in that county, and commencing with that time there has been an accumulation of funds, so that almost everyone has a surplus in the bank and new houses have been built, etc. It is a mistaken idea that the whole country must be kept for vast pastures. In 1899 Colorado had great cattle herds and vast ranches and the output was 16 million dollars. Last year, with the breaking up of all the ranches, feeding better in the winter, taking better care of livestock, etc., the output was 48 million dollars.

We have heard a great deal in these modern times of conservation. I am willing to talk about conservation with the idea or utilization of waste.

I am not in favor of conservation in the meaning we are to lock things up in their present state for the future generation. The greatest waste was to let the cattle run on the grass all winter, without care or feed. They got poor and then it took half the next summer to put back what they lost in the winter. How are you going to find any greater waste than that? There we are losing in the winter what we made in the summer time. What has changed that? It is the present system of working, and a man makes five times as much as he did under range conditions, and he keeps his animals growing all winter instead of losing. He is not wasting the material that keeps them alive in the winter, and so today we are commencing this system out there of keeping our animals growing and keeping but one crop of steers on the grass instead of three or four, and this is the thing that is bringing about such a reform in livestock conditions in the Rocky Mountain region.

You are interested in our livestock conditions,—many of your people come out to our state to buy feeders, and we have found out and they have found out that where the cattle have been kept right out in that mountain country, they need to go into a feed lot. With our new system, conditions are much better. Those who come from the corn belt and from the mountain district have a very active interest in the growing of livestock. Their interests are exactly the same. The same thing is true of this entire Western country. The Southwest furnishes us with some of the things we need, and we go north for other things. So it goes, north and south, east and west over this country. You are producing things which we need and we are producing things which you need. We do not make the most of them—bring about all their different results. We are asking for new people and new capital in our country and so are you. If we can, through such shows as you are making up here, and as other state fairs and expositions in the West are doing—induce the people in the over-crowded districts of the East to come West, we will not only benefit them, but we will benefit ourselves greatly. It is to our advantage—it is to the advantage of everyone of us. I discovered here in Wichita and among the Kansans that were here today a splendid spirit—a spirit that you got the best thing in the West and you are going to make it still better. That is the spirit that will build this great Western country and this government. This Congress can exert a great influence in educating our people to handle our soil. I have been East and found great farms thrown back and a waste because they say they are worn out. We want no such condition in the West and we must have diversified farming and we must look to this livestock feature here or we will go the same way. Let us learn the lesson of diversified farming in order that the fertility of the soil may be maintained and show splendid increases in crop production—show splendid increase instead of deterioration as it has in many other portions of the country. These are the advantages we have, having observed what has happened in many other countries, but we should be wise enough to take advantage of them.

I am sorry I cannot stay and hear the balance of the discussions in

this conference, but before I leave I want to tell a story which illustrates just what is the matter with us out here in the West. The story may be an old one to some of you, but it explains my point and I want to tell it. Two Irishmen, Pat and Mike, died, and one of them went to Heaven and the other one went down below. Pat, down below, called up to Mike and asked how he was getting along. Mike said, "Oh, not very well, I am having a hard time." Pat said, "Why, how's that?" and Mike said, "Well, there are not enough of us up here to have a good time—it is too lonely!" And that is just what is the matter with this Western country out here. We have everything in the world we could desire but there are not enough of us to build the country to make educational and social conditions what they should be. We must have many more people.

We have, in Colorado, some little verses, which illustrate our sentiments. They are the sentiments of Kansas. You can change one word if you please, and they will express the sentiments of any state, but they express my sentiments and the sentiments of all good Coloradans. They are these:

THE SPIRIT OF THE WEST.

The spirit that conquered the desert,
And made it rich with grain;
That scaled the peaks of the mountains,
Their hidden treasure to gain;
That chiseled through rocky gorges
The paths to the parks of rest—
'Tis the spirit of Colorado,
The spirit of the West.

The breezes that sigh in the forest,
Of balsam and pine all breathe
Life-saving balm to the ailing,
Pure roses of health to wreath,
From a clime of enticing enchantment
A people of vigor will wrest
The spirit of Colorado,
The spirit of the West.

The state spruce bedecked in its silver;
Our flowers of lavender hue;
Brooks tinkling music in echo,
And birds thrilling sonnets anew;
Appeal from a union of effort
To strive at the state's behest
For the spirit of Colorado,
The spirit of the West.

The spirit that builded an empire,
And makes for the public weal;
That thrills our hearts with courage,
And patriotic zeal;
Inspires us with earnest endeavor
To accomplish the noblest, our best—
'Tis the spirit of Colorado,
The spirit of the West.

Governor Hodges leaving with Governor Ammons, President Waters resumed the chair and introduced Jay Kerr, representing the Governor of Arkansas.

Arkansas

MR. KERR:

I was somewhat surprised up at our booth at the Exposition to be notified this afternoon that I was to appear here this evening and extend the respects of Governor Hays of Arkansas. I am very sorry that the Governor is not here to pay his respects personally and tell you about our great State of Arkansas. I am in the railroad business, myself, and am not in the habit of making speeches. I have never made one and I don't suppose I ever will. I know the first thing Governor Hays would have me do would be to thank you for the cordial invitation to come here to Wichita and address this Congress.

Most everyone associates Arkansas with some kind of a story, as there are a great many stories circulated about Arkansas, and they have done us considerable harm. However, I will not make any further comments about that, but will just tell you one myself.

A young fellow lived down on our road in Arkansas, who had gone to Kansas City and made a lot of money and he used to come back home to visit the old folks. He tried to prevail upon his father to go up to Kansas City and look over the town. He wanted to show him some of the great things in the big town of Kansas City, but the old gentleman didn't care to go. He was somewhat dubious about going to such a large city, but he was finally persuaded to go, so they boarded one of our passenger trains. On that road to Kansas City you have to pass through a pretty long tunnel. The old gentleman was quite nervous and as they passed through the tunnel he reached over, grabbed his son by the shoulder and said: "I told you something would happen; I knew it. I have gone stone blind!" (Applause.)

I don't know just what the Governor would have me say about dry-farming, because we don't have much dry-farming down our way. Only once in a while we have a little drought—it rains on us pretty regularly down in Arkansas. I know he would say this much: That if any of you people out here don't know how to grow crops, we would like to have you come down to Arkansas and we will show you. Just as Governor Ammons said of Colorado, we need people in Arkansas. We have lots of land and lots

of good spring water. We need people and we are doing everything we can to get them. We want them awfully bad! The fact is, the railroad I represent has an excellent road from here down there, and we would like to have some of you use it and come to Arkansas!

While we have some of the products that grow up here, I don't believe the interests of Kansas and Arkansas would conflict. I don't believe there is much competition. We grow lots of cotton and timber to market, and we have lots of fruit. There may be some competition in the fruit line, but we grow fruit in a large commercial way in Arkansas. And we have considerable to offer to the people who wish to engage in business.

I don't know whether the Governor would want me to coax any of you people away from Kansas, but you see I have been in the railroad business so long that I can't keep on my side of the fence! I want to get someone over on my side!

I am appreciative of the motive and spirit of this great Congress and Exposition, and Arkansas is glad to be one of you. I thank you.

President Waters then introduced L. A. Merrill, representing the Governor of Utah.

Utah

MR. MERRILL:

I seem to be serving as somewhat of a substitute today. This afternoon I had to substitute for Doctor Widtsoe, President of the Utah Agricultural College, and this evening I have the honor to represent Governor Spry, who expressed his very sincere regret that he could not be present and pay his respects in person.

Governor Spry is thoroughly appreciative of the work that is being done by this Congress. Ever since it held a meeting at Salt Lake City a few years ago, he has followed with deep interest the achievements of this Congress. He knows of the great many thousands of acres that have been rendered productive by the work of this Congress, and he expresses to you his sincere hope that the work shall continue until all our waste land shall have been reclaimed and rendered productive.

Many of the people of Kansas are familiar with the fact that when the great body of men and women came to this country in the early days, they encountered in the valleys of Kansas a desert waste, a land bare and desolate. But through the marvelous efforts of those pioneers, who came here many years ago, who struggled with those stubborn prairies, who fed the Indians and gained their good-will, who have endured the privations and hardships of the pioneer, that land has been converted into green growing fields, has been made to yield and made productive, until man and beast its benefits share.

The great State of Utah has been working along the line of reclamation until the land is settled. They felt that the mountain streams must be controlled and the waters stored in reservoirs for irrigation purposes, and this has been accomplished in a great measure. Much of our land is

yet unredeemed that will some day be splendid irrigated land and bear splendid crops.

We learned today from the Dean of your Agricultural College that Kansas has 50 percent of its lands under cultivation. We have less than 4 percent of our lands under cultivation, and even when our dry-farm lands shall have been utilized, when our reclamation work shall have been completed, we shall have then only about 6 percent of our lands in cultivation.

It is our purpose to utilize every advantage that we do have, to make the best of the opportunities we have. It is our purpose, and we are succeeding in a marvelous degree, in making every small acreage take care of a family. We believe that there has been great waste of the land. We believe that by intensive cultivation, utilizing the soil to the best possible advantage, we may be able to make homes for the thousands of people who are yet to come. We expect to conserve the fertility of our soil and add to that fertility, so that the lands shall be made productive and people enabled thereby to make their livelihood from the soil.

We have in Utah some splendid resources besides the agriculture. There is an immense mountain of copper, which is taken up by steam shovels, transferred to the cars and taken to the smelters. It is the greatest copper mining plant in the world. As Governor Ammons has said, they have in the State of Colorado immense coal deposits, so have we in Utah.

It is true we have not had a very great influx of population in that state, but there is no division of feeling there. All of the people of that state are working in perfect harmony, and we ask that the people give Utah a fair chance to show what they can do, and we expect to take our place side by side with the other states of the Union in the way of development of the resources of our state.

We have been very happy to meet with you in this convention—glad to see this splendid exhibition of your products. We rejoice with you in the prosperity that has come to this great Western country, and we expect to join with you in any movement that will tend to develop this section of the land.

President Waters then introduced F. S. E. Amos, representing the Governor of Oklahoma.

Oklahoma

MR. AMOS:

Mr. President, Fellow-Governors, Ladies and Gentlemen: On account of the slight indisposition on the part of our Lieutenant-Governor, our real Governor was unable to be with you, although he had planned to be present. He greatly enjoyed his stay at the Dry-Farming Congress in Tulsa last year. All of us did, and I am sure if he had been permitted to be present, he would have enjoyed this one even more so. His misfortune, however, has been my good fortune, and I am glad to be with you.

I have had considerable satisfaction and not a little amusement in listening to the compliments pronounced on their native states by the

governors of Kansas, Colorado, Arkansas, Utah, and the others. Surely, it is impossible that Kansas can have all these things, and Colorado have all these things, that Arkansas can have all these things, that Utah can have all these things, and yet that Oklahoma can spring up in the midst of these states and can have a million people drawn out of these same states. Why should these Kansans leave the land of milk and honey and go to Oklahoma. Why should they go there from Arkansas and take their politics, if there had not been something in Oklahoma?

Talking about coal, we have coal enough in the vicinity of McAlester to keep warm that climate that the preachers talk about for many million of years. We have lead and zinc enough in the vicinity of Miami to furnish material for the wars of Europe. We have apples enough and peaches enough and corn enough and hay enough—all of these things you claim—and I will add just a little bit to what the last speaker said, and say that in telling a story it is awfully good to get to tell your story last, especially a fish story. But fortunately, Oklahoma is not a state about which one has to misrepresent things. It is only a short distance from Wichita across the state line, and it is only a short distance from Fort Smith across the state line. I have been told, though, that it is farther from Fort Smith to Oklahoma than it is from Oklahoma to Fort Smith. I don't understand just exactly how this is, but I have been told that the distance is not the same.

No matter. Laying aside all joking, I am not going to tell you what a great state Oklahoma is. People in Wichita have known Oklahoma ever since she was born. In fact, Oklahoma is one of your children, and you have got to stand up for members of your own family. Oklahoma was born on account of the tremendous activities of you Kansas people. And they do tell me that there was a lot of Kansas people in the State of Oklahoma before the 22nd day of April, 1889. "Sooners," I believe they called them. Well, they have become good citizens since, anyhow. Some of them have been elected to the legislature—and some to the penitentiary. Last winter, when the legislature was in session, I thought that was the worst thing that ever could happen to Oklahoma, but since then I have seen other things—a Lieutenant-Governor, for instance, when he swings open the doors of the penitentiary.

I have greatly enjoyed this Exposition. The exhibits, I think, are even better than they had at the Oklahoma State Fair, and that is saying a great deal. I am not making too great an admission, however, because I have been told that this is a better show even than they had at Hutchinson.

If I wanted to drop one serious thought here tonight,—and I think all of us should be serious once in a while—it would be the thought that was dropped by a Belgian visiting this country. He said: "The thing that strikes me most profoundly about America is the tremendous waste I see. In the cities, the waste of men—in the country, the waste of lands." Some means ought to be found to get the unemployed and the poorly employed people of the cities on to the waste lands of the country. Belgium, prior

to this war, was a most densely populated and civilized country. It was and is yet, despite the war, a land of happy homes. In Belgium there is nothing wasted. Every back yard contains a garden, some flowers, or some poultry. There is no such thing in Belgium, they tell me, as wasted land or wasted people, and that Belgian visiting us and looking upon us as friends, was forcibly struck with the waste of people we have here—unemployed people, poorly employed people,—and the vast untenanted areas of land in this country. A farmer trying to farm too big a farm, the rancher trying to ranch too big a ranch, too many of us trying to cover too much territory.

If the State of Kansas and the State of Oklahoma were managed by the same methods and the same plan as are followed in Belgium and California, if the farmer who cultivates an apple orchard would cultivate it as well as they do in Oregon and California, I believe they would get as many and as good apples as they do in those states. In other words, I think we need to learn the lesson of thrift, and if this European war can teach us Americans to wake up, then the war in Europe, terrible though it is, will be a boon to this country. If this memorable war will cultivate in us the spirit of thrift and make out of Americans the same kind of thrifty people as are found in Belgium, it is the best thing in the world for this country.

Governor Cruce knows how to make a speech. He has a head on him as long as a tool chest and he has good grey matter in it and it is in fine working order, and I wish he were here to make a speech on this occasion. While I cannot take his place—I would not undertake to do that, in view of the grey matter,—still it is a pleasure to me to try to represent him here.

This is a great work, this is a great business, and I think the man who is getting something out of the soil is the true producer, and we lawyers and doctors and printers are parasites. You people who are farming are the sturdy oaks, and we other folks are just simply the clinging vines.

TUESDAY, OCTOBER 13, 1914

MORNING SESSION.

Livestock Session

PRESIDENT WATERS:

This is the Livestock Session of the Congress.

It will be an important session, dealing with a feature of agriculture, and especially of dry-farming, that is becoming more and more recognized.

We are peculiarly fortunate in having as presiding officer this morning an authority in the Midwest on this important subject, Dean E. A. Burnett of the College of Agriculture, Lincoln, Nebraska.

Before I present him, however, I wish to call attention to the fact that the afternoon program, a continuation of these Livestock Sessions, will be held at the Livestock Exchange, Wichita Union Stockyards, in conjunc-

tion with the sessions of the Kansas Livestock Association now in session in this city.

The plan is to assemble here promptly at 1:30, when Smith Riley, of the United States Forest Reserve, Denver, will deliver an interesting address and then at 2:15 arrangements have been made for special street car service from this building to the Union Stockyards.

The rest of the program will be carried out at that place.

I think the Secretary, Mr. Faxon, has some announcements to make.

SECRETARY FAXON:

I wish to announce, at the request of Chairman McOmie of the Membership Committee, a meeting of that committee at luncheon at the Wichita Club at noon today.

Also announcement of remaining names of members of the Committees on Resolutions and Nominations should be handed in to the Secretary's desk without delay.

I offer, Mr. President, a number of communications of interest to the Congress, including those from Minister Motherwell of the Province of Saskatchewan, Canada; a telegram from the Texas Cattleraisers Association* of peculiar interest to this particular session; and letters from Champ Clark, Speaker of the House of Representatives of the United States; F. W. Mondell of Wyoming, and Dr. John A. Widtsoe of Utah.

Note: These communications were read, and are printed later in the proceedings of this day.

PRESIDENT WATERS:

I now present to you Dean Burnett of the Nebraska College of Agriculture, the presiding officer for this morning.

DEAN BURNETT:

It is a pleasure to me to watch the growth of the Dry-Farming Congress and to watch the growth of the settlement of western portions of our state in which dry-farming is practiced to a greater or less degree; and I assure you it is a pleasure to me to have the privilege of being here this morning.

I believe that with the growth and settlement of the great upland country where rainfall is less abundant than it is in the Mississippi and Missouri valleys, a change of methods is frequently necessary in order to grow a crop. I believe that through this country it will be necessary for us to bear in mind the methods for conducting the livestock industry at the same time that we endeavor, so far as we may, to extend crop production in the dry region by dry-land efforts. Because, if we study the settlement and the growth of any farm country, you will find that you cannot divorce the livestock industry from prosperity in the development of crop production. I have in mind that just now, the development of the dry-land region or irrigated region where settlement has progressed rapidly and crop production has profited so well, there is no market for the crop. The

crop usually consists of alfalfa, small grain, and sugar beets. Alfalfa hay, which is one of the easiest growing crops, one in which there is a very large market, usually has its value cut in two.

Therefore, growing livestock is not only profitable but an essential.

Address of Dean Burnett

THE LIVESTOCK PROBLEM IN THE GREAT PLAINS.

A generation ago, the Great Plains country was the pasture land of the nation. True, the settlement of the region into farmsteads was well under way, especially on the eastern fringe, but the great free range from the Gulf to Canada stretched out toward the setting sun for unnumbered leagues, inviting the cattleman to a land where grass and water were sometimes abundant, sometimes scarce, and sometimes altogether absent. The conditions, however, were generally favorable, and the ratio of cattle to population in the United States reached its highest point in our history, while the price of meat animals was correspondingly low.

Twenty years ago, in the year 1894, the United States Department of Agriculture statistics showed 36,608,000 beef cattle in the United States, with an estimated average value of \$14.66. In January, 1914, the same statistics show 35,855,000 beef cattle, with an average value of \$31.13. It will thus be seen that the number of cattle other than milch cows has remained practically stationary in the last twenty years, while the price has increased 112 per cent on farms, and other statistics show that the price of meat products to the consumer has increased about 125 percent in the last ten years.

Dairy cattle have increased within this period from 16,500,000 to 20,700,000, and the average price has increased from \$21.17 to \$53.94 per head.

Sheep show an increase by the United States Department of Agriculture statistics from 45 millions in 1894, to 49,700,000 in 1914, but as the United States Census shows a decrease from 61,500,000 in 1900 to 52,500,000 in 1910, and a continued decrease by the United States Department of Agriculture statistics since 1910, it is fair to presume that here has been no increase in the number of sheep in the past twenty years. In 1894, sheep are quoted at \$1.98 per head and in 1914 at \$4.04, or an increase in price of more than 100 percent.

The number of swine has fortunately increased in the last twenty years to meet the increasing demand for meat products, showing 45,200,000 in 1894 by the United States Department of Agriculture statistics against 58,900,000 in 1914. The price has risen from an average of \$5.98 per head in 1894 to \$10.40 per head in 1914.

In the meantime the population of the United States has increased from 62,900,000 in 1890 to 91,900,000 in 1910, with an estimated population in 1914 of 100,000,000 people, or an increase in population of 50 per cent in the last twenty-four years.

This increase in population has carried with it a pressure for the occupation of land for farming purposes which in the earlier days was thought valuable only for grazing. By restricting the freedom and limiting the

area of the range it has greatly reduced the number of range-bred cattle until the industry is fast being driven to the mountain fastnesses, the desert areas, and to land under lease in the United States Forest Reserve. Meantime settlement has pressed hard upon these former pastures, and much land has been broken up which is more suitable for grazing than for crop production.

The settlement of land has generally resulted in its withdrawal from pasture and the use of the better portions of the land for grainraising. Generally the homesteader was too poor to own cattle and was dependent for his subsistence on the grain he could raise. If seasons were favorable he prospered; if unfavorable, he held on in poverty and in the hope that next year would again be a year of plenty; or if conditions compelled, he sold out to the cattleman. Many of these settlers were able to purchase or to bring with them a small bunch of beef cattle or a few milch cows, and the increase from this nucleus of a herd made them less dependent upon the grain crop than were their neighbors who did not supplement their grain farming with livestock.

In nearly all the Great Plains region where rainfall is so low or so uncertain as to make graingrowing precarious, the men who have developed livestock production as an adjunct to grain farming have prospered beyond those who have depended upon grain alone as a source of revenue. In this case they have frequently occupied the cheaper and rougher land rather than the smoother lands and have found the pasturing of the cheaper lands more profitable than the cultivation of the tillable land.

Regardless of the advantage which has come to the Plains region through the introduction of dry-farming methods, forage crops are much more certain to mature than grain crops, and are valuable only when there is livestock available to consume them. Kafir, feterita, cane, and the other sorghums are valuable in proportion as they can be utilized locally for livestock. The small grains which are most normally grown, aside from wheat, are also most profitable if consumed locally, as markets are likely to be uncertain and freight rates high.

A considerable proportion of the land in the Plains region is rough, sandy, or otherwise unfit for the plow. This land should be fully utilized for pasture purposes. In addition to this, all lands of the smoother class which will produce a larger net profit in grass than by cropping under the uncertainty of the seasons should be kept in grass and utilized as pasture. A careful examination of the dry-farming regions will show that the percent of smooth hard lands which should be retained in grass is much larger than would at first be supposed. It may be claimed that these lands have become too high-priced to use for pasture; but unless the land can show a net profit on the crop in an average year which will pay the fixed charges on the land, then the excess value placed on the land over its net earning power is purely speculative and not to be used as a basis upon which to establish land values or determine systems of land management. The net profit per acre in good years is less under pasture than under grain-cropping, but in bad years the net revenue is greater under pasture,

and the risk is always less as you reduce the labor cost per acre and increase the size of the farm unit, up to the limit which can be handled by a single family.

The settlement of the Plains country should not decrease the amount of livestock which can be maintained under a proper system of land management. On the contrary, it should increase the stock-carrying capacity since the growth of forage crops and of grain to supplement both forage and grass should make the country capable of supporting more cattle, horses, sheep, and swine than is possible under range conditions.

In central and western Nebraska, through the increase in price of feeding cattle, the growing of cattle for the feedlot has become equally as profitable as feeding these cattle for the market, and in many farms in eastern Nebraska this is also true. This conditions probably obtains also in Kansas and Oklahoma. The tendency of the last decade to eliminate breeding stock on account of summer drought and insufficient grass will now be at least partially counteracted by the price of cattle, which has more than doubled in the last decade; and unless we increase the ratio of meat supply to population the price is likely still further to increase.

With dairy cattle, and to a limited extent with beef cattle, summer forage crops, alfalfa, and silage can supplement native pastures. Instead of keeping steers until thirty or thirty-six months of age to make them weigh 1,000 or 1,200 pounds, they can be made to reach the same weight and be ready for market at from eighteen to twenty-four months, saving a year of maintenance. As at least one-half the ration on full feed goes into body maintenance, the only excuse for marketing cattle at three years instead of two years will be to utilize cheap forms of roughness, which is always profitable even at the expense of slow growth.

We are rapidly coming to the point where our cultivated lands must grow beef rather than fatten cattle, and, while it may always be profitable to buy some feeder cattle from the region of cheap land and low-priced roughness, our farmers should at least study the problem of finishing their cattle for the market where enough grain is grown to supply the local needs and a surplus for shipment.

The silo is becoming a necessary adjunct not only to the farmer on high-priced land but also in the dry country where a crop may grow to approaching maturity and be lost through drought before it is needed for feed unless it is preserved in the silo. Through most of the dry region, the pit silo is more efficient than the one built above ground. It can be constructed by the farmer himself with almost no outlay except for cement with which to plaster the walls. It does not blow down, and upon the dry lands little or no danger of seepage exists. With the increased interest in livestock which is now taking place, the use of the pit silo is likely to be greatly extended.

In feeding calves for baby beef at the North Platte Station, where five different rations were fed, the lot receiving alfalfa hay, corn and a limited ration of silage made the largest gains, the cheapest gains, and the most profit per head. The next cheapest gains were made upon alfalfa hay

and corn with a little prairie hay. With 900 pound cattle at the central station practically the same results were secured—in one experiment alfalfa and corn being superior to all other rations.

In regions farther south where cottonseed is cheap and alfalfa hay is not available, cottonseed-meal may be substituted to balance the ration, though our experiments would show that for Nebraska alfalfa is much more desirable.

In Texas where kafir and milo were fed to steers in comparison with corn, both kafir and milo produced larger gains than a ration of corn and molasses, when cottonseed-meal was fed to all lots. This experiment will serve to show the high value of kafir and milo and their adaptability to finishing cattle where they are a market crop.

Experiments reported in 1914 Bulletin 198 of the Kansas Experimental Station show the cost of wintering beef cows on kafir stover, wheat straw, and one pound daily of cottonseed-meal to be \$5.61 for a 100-day period. Against this was fed kafir silage, straw, and one pound of cottonseed cake, costing \$6.30 for the 100-day period. Where kafir stover was fed, the cows gained only 35 pounds each in the 100 days. Where the kafir silage was fed, they gained 134 pounds each in the same period. By feeding silage instead of dry forage an additional gain of 100 pounds per cow was secured at a cost of 69 cents.

Reduced to an acre basis, it requires to feed a beef cow 100 days:

Lot 3—Kafir fodder .....	.34 acre.
Wheat straw .....	.52 acre.
For 100 days .....	.85 acres.
Lot 4—Kafir silage .....	.22 acres.
Wheat straw .....	.71 acre.
For 100 days .....	.93 acres.

In the same experiment in wintering beef steers, the cost of grains upon various rations was as follows:

Corn, silage, and cottonseed-meal.....	\$3.60 per 100 pounds.
Kafir, silage, and cottonseed meal.....	3.37 per 100 pounds.
Sweet sorghum and cottonseed-meal.....	3.46 per 100 pounds.
Corn silage and alfalfa hay.....	3.83 per 100 pounds.
Corn stover, shelled corn, and alfalfa hay.....	3.66 per 100 pounds.

The gains varied from 1.5 pounds to 1.62 pounds daily, or not less than 45 pounds monthly, and were made at a cost not much above the cost of gains on grass. Where the wintering of cattle can be reduced to such figures, the opportunity of making a reasonable profit in raising beef cattle is assured.

With the present relative prices of stock cattle and fat cattle only the exceptional dry-land farmer will find it profitable to fatten cattle upon grain in the feedlot, since the majority are so much better fitted to keep a breeding herd and grow cattle for the feed lot of the corn belt farmer.

In Nebraska the swine industry has extended itself into the extreme western portion of the state, especially in the valleys, where alfalfa may be raised, and on the uplands, where corn, barley, or emmer is grown as a market crop. This sunshine region, with its dry climate, its freedom from swine disease, and its cheap feeds, has generally shown a good profit on the cost of production. The ease and rapidity with which the small farmer can get started in raising pigs is a great advantage to the man of small means. A brood sow, an acre of forage, a little small grain to fatten the litter, a little attention and the job is done.

The North Platte Experimental farm, where about three carloads of hogs are raised each year for the market, has shown a greater profit upon the investment in growing pork than in any other farm operation. Grain purchased at the market price has frequently shown a profit of 100 percent by feeding to hogs, either upon alfalfa pasture or with alfalfa fed in racks to supplement the corn ration. Wheat and rye used as a winter pasture with alfalfa hay and a very small grain ration has proved a most economical method of wintering brood sows, and approaches in cost a full year pasture season, but it can only be used where wheat or rye makes a satisfactory growth in the fall months.

Hogs will consume with profit ground kafir, or sorghum seed where the supply of corn is limited. At the North Platte Experimental Farm, ground cane seed was found to be about one-half as valuable as corn, bushel for bushel. With ground cane seed figured at 50 cents per bushel and alfalfa hay at \$8 per ton, pork was produced at a cost of \$5.78 per 100 pounds. Where the cane seed and corn were fed in equal parts, the cost of pork was reduced to \$4.30 per 100. In the latter case, corn was figured at 47 cents per bushel, which was the current market price at the time the experiment was conducted. In this experiment, with hogs selling at \$5.90 per 100 pounds, cane seed brought 55 cents per bushel and corn 82 cents per bushel. With hogs at the present high values, both corn and cane would show a higher feeding value.

Milo, where fed experimentally at North Platte with three-fourths corn, proved equally as valuable as barley and nearly as valuable as corn.

In Kansas experiments reported in 1906 where kafir, mi'o and corn were fed with 25 percent of the ration soybeans, it required 33 percent more grain to produce 100 pounds of gain from cane seed than from kafir, and 26 percent more grain than where cornmeal and soybeans were fed. The cost of production, however, was low enough to return a liberal profit at the present market price, and the results are here given to illustrate the fact that swine production need not be limited to the corn belt region but can be developed with profit wherever kafir, milo, the sorghums, or other feeding grains are produced.

The single crop system brings with it a succession of weeds which follow the plowing, sowing, and harvesting at the same period year after year. In the Red River valley and over much of the spring grain country, sheep are used to clean the land of weeds and act as scavengers on the farm, converting what would otherwise be a menace to weeds and refuse

into mutton and wool. In the Plains country the same system may be followed with profit. The grains produced in the Plains region are suitable for fattening sheep, and since these lands lie on the direct route between the range and the central markets, range sheep can be fed to advantage. In much of this region the valleys are the great sources of alfalfa hay, and this furnishes an additional reason for a study of the feeding problem.

The Great Plains region has long been known as the home of the sheep, where large bands have run at a profit, but is equally profitable to keep smaller flocks where the land is under a system of cropping and the residues are to be gleaned by the flock. Throughout the Dakotas and to a limited extent in Nebraska, rape is sown as a secondary crop with small grain and the aftermath is pastured, following the harvest of the grain. By this means crop residues are utilized which would otherwise be wasted and grass is gathered at a profit.

Let no man think that the price of livestock will materially decrease through our efforts to increase production. We will be fortunate indeed if we are able to increase production so that it will keep pace with the demands of our increasing population.

There is no necessity for the price of meat becoming excessive if we will utilize the residues which are now wasted on our farms and convert them into meat products; and at the same time develop a careful system of farm management in which animal production is given its proper place.

The prosperity of the Plains region will depend upon the adaptation of the agriculture practiced to the natural limitations of the region. Some of this agriculture will be intensive, with irrigation and valuable money crops, like the sugar beet. Wherever possible, alfalfa will be a standard crop because of its drought-resistance, its high money value, and its enrichment of the soil.

Throughout the entire region, livestock should fill an important place in the system of management.

CHAIRMAN BURNETT:

We do not have with us, George W. Rommel of the United States Bureau of Animal Industry, but he has sent as his able substitute Mr. T. P. Metcalfe of Texas, who will now address the Congress on the subject, "Beef Production on the Great Plains."

Address of Mr. Metcalfe

BEEF PRODUCTION IN THE GREAT PLAINS REGION.

I assure you it is indeed a great pleasure to appear before you this morning talk to you on this subject. I am sorry Mr. Rommel could not be here, as he would have given you a good talk and many of his valuable experiences.

For ease of discussion the subject of "Beef Production" may be divided into four parts: First, the maintenance of stock cows from which calves are raised; second, maintaining and growing of stocker steers; third, finishing or fattening out of aged or mature steers—in this class are to

be considered only steers of two years old or older; fourth what is known as "calf-feeding" or the production of "baby beef."

In the production of any farm crop, and also in the production of beef on the stock farm, the labor question is one of the main factors to be considered, and for that reason we must be especially careful in our work with cattle to see that we expend the least amount of labor on them that is practical to get the best results. For this reason we must depend as much as possible on pasture. For summer pasture there is nothing better than our good native grass, and every farmer should have a large part of his land in native grass, running his cows on this pasture during the summer and depending on some other substance for his winter feed. By doing this he is able to utilize his pasture to its fullest extent and will therefore get the greatest returns from it. For winter maintenance, there is nothing better than wheat pasture. Where a man will put his wheat in early so that it will make a good growth before winter he can get a large amount of pasturage from it, thus furnishing a very cheap winter feed and by removing his cattle early in the spring he may get just as good a crop of wheat as the man who did not pasture his wheat at all. Even if he gets no wheat he will be repaid for his labor and expense in putting in the wheat from the pasturage he gets from it.

But a man should not depend on his pasture and wheat alone, for in dry years both would be "short," and he would either have to sell part of his cattle or buy high-priced feed.

The greatest substitute for pasturage is silage, and no stock farmer should be without a silo, for with silage he can substitute his short pasture in the summer and his wheat in the winter, either when his wheat is short or during that period between when he should remove the cattle from the wheat in the spring and the time when the native grass is ready to be turned on.

Three years ago there were not more than 12 or 15 silos in the whole Southwest, while at the present time there are several hundred and more were put up this summer than in any previous year.

In this connection one should never consider lightly any roughness he may have around the place, such as wheat straw, kafir butts, etc.; especially when cattle are on wheat pasture or silage in the winter, for they seem to crave a small amount of dry roughness and it will help wonderfully. It might be well to state that in wintering stock cows the use of a small amount of cottonseed meal is one of the best investments a man can make, for it furnishes the bone and muscle building elements and insures a strong cow and a well developed, vigorous calf in the spring.

The problem of maintaining the stocker or growing steer is very similar to that of keeping the stock cow. The steer should be kept on pasture as much as possible, utilizing the native grass in the summer to its fullest extent, and depending on wheat pasture and silage in the winter, with our cheap roughness as a substitute.

In our cooperative work in the Texas Panhandle, testing out the relative value of different methods of wintering steers the men are strongly

in favor of a ration something like this: Twenty to twenty-five pounds of silage; $\frac{1}{2}$ pound of cottonseed meal; and roughness such as wheat straw, kafir, or sorghum butts, or threshed kafir. With the ration mentioned above two and three year old steers have come through the winter stronger and done better than other steers getting larger amounts of cake and run on good native grass or fed much larger amounts of dry roughness such as good bundle kafir or sorghum.

It has been demonstrated many times that good gains can be made in fattening mature steers with a ration of cottonseed meal and silage. When getting only this ration a 900 to 1000 pound steer will eat about 50 or 60 pounds of silage and should receive five or six pounds of cottonseed meal; however, it is probably a better idea to give the steers just about what silage they will clean up readily within an hour and a half to two hours and then keep some dry roughness before them all the time. Feed twice a day.

Last winter some work was done in the Texas Panhandle to determine the relative gains that steers would make when fed a full ration of cottonseed meal and silage and steers getting the same amount of cake, yet running on good native grass. The steers were good grade Hereford steers of average Panhandle quality and two years old. On account of shortness of feed the steers were only fed 48 days, so one can see that the steers were not by any means finished but were just well started on a feeding period. At the end of 48 days both lots of cattle were shipped to Kansas City and sold on the market, both bunches going to feeders. Below is given the data obtained in this feeding demonstration:

	Lot I*	Lot II*
Weight of steers at beginning of experiment.....	885	864
Weight of steers at end of 1st 30 days.....	907	969
Weight of steers at end of feeding period (48 days).....	897	1006
Grain for entire feeding period (48) days.....	12	142
Daily gain	$\frac{1}{4}$	3
Value per pound at beginning of experiment.....	\$ 0.055	\$ 0.055
Value per steer at beginning of experiment.....	48.67	47.50
Cost of cake or meal (308 pounds at \$32 per ton).....	4.93	4.93
Cost of silage (2727 pounds at \$3 per ton).....	.....	4.09
Cots of grass (48 days at \$.40 a month).....	0.64	.....
Cost of sorghum (79 pounds at \$6 a ton).....	0.24	.....
Cost of sorghum (10 pounds at \$6 a ton).....	.....	0.03
Cost of marketing, etc.	4.05	4.05
Total cost to put steer on the market.....	58.53	60.60
Value per pound of cattle in Kansas City.....	0.07	0.0725
Total value of cattle in Kansas City.....	59.00	68.00
Profit	0.97	7.40

*Lot I, cake and grass; lot II, meal and silage.

The average feed of cake or meal was about six pounds a day, and the average feed of silage was about 57 pounds.

One can see that neither lot of cattle was finished, yet the cattle getting silage made good and economical gains and made the owner some money, while the cattle on grass made practically no gain and very little profit.

If one should want to fatten out a bunch of steers on grass it is suggested that he winter his steers well, keeping them strong and probably gaining a little all winter. This can be done by the use of wheat pasture or silage and two or three pounds of cottonseed cake, then when the pasture becomes good in the spring turn out on grass and continue to feed cake, giving about three pounds of cake a day to each steer. With such treatment as this the cattle should be ready to go to the market somewhere between the first and the middle of July. One of our cooperators by following such a method, this past year, made \$4 worth of cake net him \$20 in increased value of one bunch of steers over another, just by feeding the cake on grass from about the first of May to the middle of July.

The above method is recommended to those who wish to ship mature steers from off pasture and not give them a period of full feeding.

The proposition of calf feeding or the production of "baby beef" has been left to the last, for though very much talked of, it is probably, at the present time, the least practical of all phases of beef production for the average farmer or man of little experience in cattle feeding to enter into. There is no part of the beef production problem that is so interesting or has as much promise as the fattening of calves, yet it is the most difficult of all cattle feeding operations and one that requires a great deal of experience and knowledge to carry it out successfully. When a calf is put into the feedlot and given all the feed it will eat, its nature is to grow, and it requires the greatest attention to details on the part of the feeder in the way of handling the calves, selection of, and the right proportions of feeds, to get the properly balanced ration and many other things that the feeder can learn only through experience. Many men, to their sorrow, have tried to fatten out a bunch of calves on a ration of cottonseed meal and silage and other similar feeds, but they found that though the calves made excellent gains the gains were not in the right place; for instead of putting on fat and taking on that prime condition of flesh that is so essential to finished "baby beef," they only grew, making their gains in bone and lean meat.

One cannot go into details, but for a general basal ration for use in calf feeding the following ration is suggested: Twenty to 25 pounds of good silage, 2 to 2½ pounds of cottonseed meal, and 10 or 12 pounds of ground kafir, or if the crushed heads are used, use enough to make an equal amount of grain. The feeder, of course, cannot stay strictly with this ration, and it is not intended that he should, for he will have to vary it to suit his conditions, calves, etc. It will probably be a good idea to cut down the meal even more toward the end of the feeding period. It should have been said before this that one should not expect to feed his calves less than 150 days, and if possible six or eight months.

As said in the beginning, the feeding of calves is the most difficult of

all cattle feeding operations and the one that requires the most skill and experience, yet there is no branch of beef production work that offers such opportunities to the stock farmer and holds out such interesting work and financial rewards to the man who will take up the work and by careful, constant study work out this great problem of successful, economical beef production in the "Great Plains Region."

DEAN BURNETT:

I wish to reinforce what Mr. Metcalfe has said about the pit silo.

Nebraska has found that the pit silo is very valuable; especially where little expense is put into one of them.

Many more people are enabled to put in silos than formerly, since the advent of the pit silo.

I now have the honor of introducing to you Mr. A. F. Mantle, Deputy Minister of Agriculture of the Province of Saskatchewan, Canada, who will speak to us in place of Professor W. J. Rutherford, of the University of Saskatchewan, Saskatoon, on "The Livestock Industry in Canada."

Address of Mr. Mantle

THE LIVESTOCK INDUSTRY OF CANADA.

I am not a livestock expert, but I will bear testimony to the fact that Secretary Faxon and others did their best to secure one from western Canada who would be better prepared to talk on the subject.

We have heard this morning some very interesting remarks concerning the livestock situation in the Middle-West in its relation to dry-farming; also some equally interesting experiences on dry-farming and livestock in the Southwest, and I may say that our problem in western Canada does not differ in its essentials from what has been outlined to you from these two quarters.

Pretty nearly everybody who reads the papers or who goes around the world with his eyes open is aware of the fact that western Canada can grow large yields of wheat, but it is probably not so well known that we can raise just as good livestock as wheat. While for the time being wheat, oats and flax are the staple products, the time will come when their place will be taken by the livestock products. I find some people have the impression that because we are favored with clear cold winters in the Canadian West, that the country cannot be devoted to livestock production—that the milk cows would freeze up, and the little pigs would freeze stiff, and the sheep would get their fleece full of snow—but that is not the case, for the climate from one end of the year to the other is favorable for all kinds of livestock raised.

As an illustration, I might refer to a couple of instances that came to my notice of conditions under which some livestock was kept on the College Farm last winter. The brood sows of the college, some thirteen in number, were wintered in an A-shaped colony house in an open stubble-field. We had a good winter last year, fairly free from bad weather, and possibly a higher temperature for the winter than usual, but there was one period

when the weather was very bad. Notwithstanding these conditions, the 13 sows wintered in this house. They were fed about 150 yards away from the colony house, and the oats were fed to them on the ground. They had to walk there from the colony house. A dry, warm place in which to sleep, exercise at least once a day, preferably twice a day, proper feed, and the sows came through the winter in excellent shape without losing any of their litter, which goes to prove that a cold winter does not necessarily mean an unhealthful condition for livestock.

Second illustration: The college bought a number of range ewes and put them in winter quarters at the College Farm on an eighty acre field without shelter or protection of any kind. Their forage was just what they could pick up around the field and for water, they got snow. Towards spring they were given some wheat screenings, one pound per day to each ewe. Later they were put on rye, later on alfalfa, and these ewes averaged one lamb and a half each. So, if the three conditions are fulfilled, a dry place to sleep, exercise and proper feed, the winter is not detrimental to the raising of livestock.

Another misconception is that we have a very wide range on our dry-farm region for pasture. We do not have satisfactory and dependable summer pastures. Oats and barley are our main dependence in the way of feeds. We will go into competition with the world in the growth of large crops of extra quality of field oats. Then, in the matter of forage, we are rapidly getting into alfalfa and there is no part of the province where we cannot grow alfalfa and successfully. We haven't yet got very far along in the way of silos. I do not believe there are any silos erected on private farms, but the College has put up several on the College Farm.

As to the very necessary marketing end—I have sought to indicate that we have everything that is required for satisfactory producing—I may say that at the present moment, our position is about this: We are producing an oversupply of hogs. Canadian bacon has come down considerably in price. In talking with the manager of Swift & Company of Winnipeg, he states that they are shipping out from Winnipeg just as much as two or three years ago they were bringing in of pork and pork products. While cholera has invaded our province, it is, in a great measure, controlled by the cold climate which tends to eliminate the disease.

In the matter of horses, we are probably self-supporting at the present time. In the matter of cattle, we are probably not self-supporting. I believe that dressed beef is brought into the country still. In sheep we are very, very far from being self-supporting. In poultry we are self-supporting, but not in eggs and butter; but I think the Canadian West will soon produce enough to supply us.

You may ask what is the drawback? Why does the country continue to grow wheat and oats so extensively when livestock will do so well and is more profitable? The first drawback is the matter of capital, as many who come into our province are comparatively without capital. The cost of living and the cost of development have been high, and in consequence of it, it has left the vast majority of our farmers handicapped, many in debt,

and without the means with which to purchase the livestock which they realize their farms should and could maintain, and also without means to provide shelter for them. We are seeking a means to offset this lack of capital, the Government, in many instances, bringing in the livestock and selling it to a local association of farmers on credit, also by placing in a large number of communities, bulls and stallions of good quality, so the farmers may at least breed their stock to a better quality of sire.

Another lack in some districts is lack of adequate and dependable water supply. That, of course, is only in a very few districts a permanent disability. It is practically related to this question of capital. In some districts where they have to dig from 150 to 200 feet to get water, it is very expensive to put in a good well. It is, however, only a temporary disability. The four sources of water supply are, surface water or streams, shallow wells, the artesian well, and surface reservoirs. Where the reservoir is properly constructed, that is, well protected around the outside with a shelter of willows, assuring that it will be filled up in the spring of the year, the reservoir forms a source of water supply, whether for stock or domestic purposes, which is in advance of many of the surface wells. The Minister of Agriculture has depended, on his own farm, on that source of water supply, for a number of years.

Another disadvantage is lack of labor supply that would attend to livestock. The Government has sought to overcome this difficulty by establishing a labor office in Great Britain and there picking out men who would prefer handling livestock, and we have given loans to these men to enable them to come out on these farms, and in that way we have brought out several experienced cattlemen. Another drawback is the matter of marketing facilities. The government has established creameries throughout the country, and dairying has tended to increase very rapidly, and marketing facilities for dairy products have been greatly improved. The final drawback is the matter of summer pasture.

Our Government is alive to the need of linking up dry-farming and livestock, and is working on a solution of the problem.

DEAN BURNETT:

I am sure that if all substitutes prove as satisfactory and interesting as Mr. Mantle, we shall have no regret.

It is now my pleasure to introduce as the next speaker James T. Jardine of the United States Forest Service, a brother of our good friend Dean Jardine of Kansas.

Mr. Jardine will speak on the subject, "Management and Improvement of Lands Suitable for Grazing Within National Forests."

Address of Mr. Jardine.

MANAGEMENT AND IMPROVEMENT OF LANDS SUITABLE FOR GRAZING WITHIN NATIONAL FORESTS

To appreciate fully range management on National Forest lands, its problems and the progress made under regulated grazing, it is essential

to have in mind the extent, character and importance of the forage resources involved.

The gross area of National Forest lands, exclusive of Alaska, on June 30, 1914, was approximately 158½ million acres. Of this area 70 percent to 75 percent is suitable for the pasturage of livestock at some time of the year.

Primarily, it is range within timbered or brush lands with a minor acreage of untimbered lands, made up of exposed slopes of otherwise timbered mountains, small mountain meadows, areas of grass land above timber line, cut-over and burned-over areas, all of which produce forage which is used, or may be used for cattle, horses, sheep, goats or swine.

Distributed as the land areas are throughout the West, from the Mexican line to the Canadian line, varying in altitude from near sea level to the upper limits at which vegetation will grow, and varying in ruggedness from level to inaccessible, they present a wide variation in length and time of growing season, moisture conditions, soil conditions and a consequent wide variation in the composition of the forage crop, even on areas of the same range type located in different sections of the National Forest region.

When the forests were placed under the jurisdiction of the Forest Service, nine years ago, it was realized at once that this forage resource represented a valuable asset upon which not only the welfare of the stock industry, but of a large portion of the people was dependent, and steps were taken to work out a plan which would develop it and promote its use to the fullest extent consistent with good forest management. The net result is that in 1914, permits were issued allowing 1,616,880 cattle and horses, 7,560,186 sheep, 58,616 goats and 3,381 swine to graze on lands within the forests and at the same time adequate protection is given to the forests, watersheds, camping grounds and other uses for which these lands are valuable.

The first step was to open to use many areas previously unused and to authorize full use instead of restricted use of much additional territory. Primarily, as a result of this policy the gross acreage of the average grazing unit (range for one cow) was reduced one-third during the years 1905 to 1907, inclusive. Then followed the real work of constructive management. A large proportion of the more choice grazing lands added to the forests had previously been badly overgrazed as a result of overstocking, premature grazing and bad methods, or lack of methods, or handling the stock. It was evident that a material reduction in the number of stock must be made before damage to forests and watersheds could be checked and the foundation laid for improvement in the range. Nine years of experience in managing all varieties of impoverished range has further convinced the Forest Service that every year of delay in limiting the number of stock to what the range, in its existing condition, will properly support, adds to the difficulty and time necessary in building it up.

By cooperation with stockmen in developing and opening up new areas, shifting stock to less heavily used areas, and, when these methods were

not possible, decreasing the number gradually, the necessary reduction has been accomplished without serious loss to the stock industry.

Next to heavily overstocking, continued premature grazing has been most prominent in bringing about the deterioration of Western ranges.

In the fight for range under the old system of free-for-all grazing, stock were rushed to the range when the snow had barely disappeared. The tender foliage was cropped or trampled out as fast as it appeared above ground, a practice which, if continued, will kill any range.

The second step in the constructive policy was to establish regular grazing seasons for each locality, in order to eliminate this premature grazing and its detrimental effects as far as practicable and consistent with the absolute needs of the local stock industry.

With a reduction in stock to what the range would properly support and the premature grazing largely eliminated or planned for, it was possible to give attention to more detailed constructive work.

An effort was made to divide the range fairly between the different kinds of stock, considering forest management and protection and the adaptability of the range as well as the local needs of the stock industry; then to divide the range for a given class of stock between those who were entitled to a grazing privilege for this class of stock, giving each permittee, so far as possible, his individual range and protecting him against encroachments from other stock.

This was the final step in eliminating the necessity for waste or bad management through competition for the forage on a given area and gave an opportunity for further constructive management on the part of both the Forest Service and the stockman.

While the adjustments to eliminate overstocking, premature grazing and the destruction of range through competition for forage were gradually progressing, work was being done also with a view to bringing about better methods of controlling and handling the stock so as to reduce the waste of forage from trampling and secure better distribution over the entire range.

Any travel by the stock further than absolutely necessary to secure feed and water means a decrease in the amount of meat produced with a given amount of forage. With this as a basic principle, the effort has been—and still is—to eliminate all unnecessary handling of the stock, whether sheep, cattle, horses, goats or swine.

In controlling cattle, natural topographic units have been used as far as they will serve.

It was early recognized, however, that topography must in many cases be supplemented by drift and division fences.

Accordingly, a regulation was secured allowing the construction of fences where it is evident that they will be beneficial to the stock, the forest or the range and will not give unfair advantage to the individual.

In the majority of cases the Service has cooperated with stockmen in fence construction. The fencing privilege has been gradually elaborated

until it has become an important feature of range management and promises to be more so in the future.

To get a better line on the economic value of drift and division fences to range management and stock, as well as to work out efficient methods of construction for the adverse conditions under which fences must be maintained, a general study was made in 1913 of 320 separate drift and division fences, a total of over 2000 miles, under widely varying conditions.

The data secured show the net result to be: An average increase of 10 to 15 percent in carrying capacity of the range; from 0 to 100 percent improvement in the grade of stock; 5 per cent average improvement in condition of stock; 5 to 10 percent average increase in the calf crop; and an average decrease of approximately 40 percent in the expense for riding and looking after the stock during the grazing season to which the fences apply.

The distribution of stock within the controlled area has been greatly improved by development of well distributed watering places and by the use of carefully selected salting places to supplement fences and water.

A careful comparative study of sheep unmolested in large range pastures and under the old methods of herding in large bands driven to and from a central camp each day, showed the advantage of the pasture handling to be from 25 to 50 percent in carrying capacity, an increase of 8 to 10 pounds in the weight of five months old lambs and a decrease from an average loss of 3 percent to $\frac{1}{2}$ of one percent.

But the time was not ripe for sheep pastures, proof against predatory animals, on a large scale for the rugged territory used by sheep.

The alternative was to improve the method of range herding so as to approach pasture handling as nearly as was economically possible.

The result is that perhaps 50 percent of the 7,560,186 sheep on National Forest range in 1914 were handled under what is called the "new system," "bedding out system," "blanket system" or "burro system" of herding, which simply means that the herder stays with his sheep rather than with his camp; controls them by quietly directing the leaders during the day and sleeps with them where they happen to stop for the night.

Carefully collected figures on weights and carrying capacity under various range conditions show this system to mean 5 pound heavier lambs and an increase of 10 to 15 percent in carrying capacity over the old method of range herding.

The essential, fundamental principle of range management to be emphasized here is the importance of controlling the stock and eliminating all unnecessary handling, as well as congregating in large herds, whether cattle, horses, sheep or goats.

Most of you know from experience in feeding, the value of the individual pen and quiet handling. The principle involved in feeding is of even greater importance in the efficient management of the five million acres of natural grazing lands.

That this has been more fully realized is due to lack of thought and

study relative to range and pasture management as compared with the vast amount of study given to the feeding end of production.

The gross measure of the improvement, as a result of this constructive policy is partly shown by the fact that for the National Forest range as a whole, the average range unit has been reduced from 57.6 acres in 1907 to 50.45 acres in 1914, or, in other words, a gross increase of 14 percent in the number of stock grazed.

This increase, however, does not adequately represent the actual improvement. Instead of being left in an overgrazed condition in the fall the range, with few exceptions, has been greatly improved and is now left in condition for maximum production the following year; stockmen are now turning off beef and mutton direct from many ranges where formerly only feeders and frequently poor feeders were produced; and the areas of forest and watershed needing it are given adequate protection.

For National Forest conditions in the past, it would be difficult to state which one of the constructive lines of improvement discussed has been most important in building up the range and increasing the meat production per given acreage. Each step was important and preceded the others naturally in the order given.

The area of new range to be developed, however, has materially decreased and the adjustment of the number of stock to what the range in its existing condition will carry is largely accomplished.

In future management, therefore, the major advancement will be brought about by perfecting the methods of handling the stock and by perfecting the system of grazing each area so as to secure the fullest possible use and at the same time give the vegetation a chance to maintain a vigorous plant constitution and reseed itself naturally.

It is along these lines that the range investigations carried on by the Forest Service in cooperation with the Bureau of Plant Industry have been concentrated and have done most toward the upbuilding.

Since the members of the Congress are, perhaps, most directly interested in the management of range, largely under fence, within the short grass and bluestem territory, some detail of the experience and results of the Service, both experimental and under practical application, in reseeding depleted range and maintaining it in a state of maximum production without loss of forage through non-use, will be of greater interest and more directly applicable to the conditions in this territory than any other phase of management.

Obviously, to bring back depleted range to normal or maximum productiveness it must be seeded, either artificially to forest species, seed of which is available on the market, or it must be so managed as to secure natural reseeding with the existing native vegetation of value as forage.

Beginning with 1907 the immediate appeal from every locality of the National Forests was for seed to plant artificially, for the reason that to secure natural reseeding promised slow results.

Many areas were so badly denuded that revegetation by natural reseeding appeared to be impossible, and at best natural reseeding, it was

believed, would involve closing the areas to grazing and consequent serious interference with the stock industry of the West, if attempted on a large scale.

The results from artificial reseeding tests conducted by other Bureaus of the Department of Agriculture, however, convinced the Forest Service that seeding, even with the most promising species, should be further established as economically possible, by experimental tests before seeding of range on a large scale was undertaken. Between 1907 and 1912 over 500 seeding tests, distributed over 86 National Forests, using the more promising available forage plants, were initiated and observed until declared successful or failures. The essential conclusions were: that artificial seeding of range with species at present available can be accomplished economically only on mountain-meadow areas of good soil and moisture, alluvial bottoms along creeks, or on small dry meadow or mesa areas where water can be diverted over them at a cost not prohibitive.

Even on such lands one year's protection against grazing is necessary after seeding in order that the seedlings can establish a good root system before subjected to grazing.

The area of land meeting these requirements is limited to perhaps 5 percent or less of the total area used for grazing within National Forests.

Range improvement on Western natural grazing lands, either within or outside the National Forests, by seeding to cultivated species, can be but comparatively unimportant until seed of species which are more resistant to drought and grazing than those at present available, can be secured at a cost not prohibitive to use on lands naturally of low productivity. It is not probable that such species will be found for a few years at least.

Improvement on approximately 95 per cent of the area used for grazing within the National Forests and on almost all of the remaining public domain range must, then, come in the near future as a result of protection and natural reseeding of the native forage plants. The problem is to accomplish this in the shortest time possible without serious interference with the stock industry.

Grazing management, which will do this, must take into account the important forage plants and their requirements of growth and perpetuation, and it must be practical from the standpoint of profitable meat production.

With a view to developing a plan of using the range which will harmonize the requirements of the vegetation and the requirements of the stock to the greatest degree possible, studies were started in 1907 to determine the growth requirements of the important range forage plants and the essential factors, including grazing, which are primarily responsible for the success or failure of these plants in their growth and perpetuation.

The conclusions reached to date, relative to the requirements of plant growth, under range conditions, may be summarized as follows:

1. Removal of the herbage year after year during the early part of the growing season weakens the plants and results in delayed resumption

of growth in spring, a decrease in the amount of foliage produced, delays the time of seed maturity and results either in non-fertile or very few fertile seeds.

2. Plants badly impoverished through continuous premature grazing require from one to three years of protection to regain their vigor, sufficient to produce fertile seeds, the time depending upon the extent to which the plants have been weakened.

3. Removal of the herbage after seed maturity in no way interferes with plant growth unless the roots are injured by trampling. The time that growth begins the following spring, the amount of foliage produced, the amount of seed produced and the germination power of the seeds are approximately the same as when the herbage is undisturbed during the entire year.

4. Germination of the seed and establishment of the seedlings very largely depend upon the thoroughness with which the seed crop is planted. Though nearly all seeds will germinate on the surface of the ground, the resulting seedling plants, in a locality where the soil dries out early in the season, as it does on most of our range lands, are unable to extend their limited root systems deeply enough to reach the moist lower soil, and consequently die from drought. The seed of the majority of our valuable perennial range plants are comparatively large and smooth, and as a consequence do not work themselves naturally beneath the surface of the soil as do the seeds of porcupine grasses (*Stipa*) for example. If reproduction of these better species from seed is to be secured they must be artificially covered.

5. Even when a fertile seed crop is well planted approximately 50 percent of the resulting seedlings die as a result of drought and frost during the first year when the roots have reached only a superficial position in the soil, and the remaining 50 percent will be largely destroyed if the area is grazed early in season the year following seeding. During the second and third seasons there is little loss from natural factors and the plants make a rapid development. By the end of the third season the new plants are well established and usually produce seed.

These conclusions were established as the result of numerous plot studies distributed over ranges in various stages of depletion from almost denudation to areas on which the vegetation was in prime condition or vigor. Approximately fifty species of important range plants were included in the observations.

With these data as a basis, a system of grazing known in the Forest Service as "deferred and rotation grazing" was planned. The essential principles of this system are:

1. A portion of the range sufficiently large to supply the forage from the time of seed maturity to the end of the grazing season is protected from stock until the seed crop has matured.

2. Upon maturity of the seed crop the forage is grazed as closely as possible without injuring the seed plants by trampling.

3. The same area is treated in the same way during the second year

except it should be grazed moderately. If the original vegetation was vigorous this area may be grazed early in the season of the third year and a second area chosen for protection and reseeded. If, however, the original vegetation was badly overgrazed one or two years of protection are necessary before the vegetation regains its vigor sufficiently to produce fertile seed. In such case the rotation must be on the basis of three or four years' protection until seed maturity.

When the first area has been thoroughly reseeded it is grazed early and a second area set aside for protection and natural reseeded. This alternation between early and late grazing is continued not only until each portion of the range has been revegetated, but afterward, in order to maintain the vegetation in vigorous condition and provide for an occasional seed crop being planted.

This plan of management has been gradually extended to both sheep and cattle ranges during the past four years and careful studies, supplemented by general observations made to determine the comparative improvement in the range under this system, under total protection against grazing and under the old common practice of grazing at large throughout the season year after year without regard to the stage of development of the vegetation. The essential conclusions are as follows:

1. Under the old system where the stock graze at large over the whole range throughout the season, the choice vegetation is interfered with by continued clipping prior to full development and the inferior species are left to the last and thus given a chance to maintain vigor and produce seed. If this system is continued on a well stocked or heavily stocked range the choice perennial species gradually decrease in vigor, produce less and less foliage, and do not reproduce, while the inferior species increase as a result of the unfair competition. The inevitable result is a continued decrease in carrying capacity of the range. This is what took place on many of the bunch grass hills and short grass valleys and plateaus in Western ranges in the past, and is still taking place to no little extent on public domain range and many privately owned lands.

2. Under year long protection from grazing, vegetation previously overgrazed readily recuperates, produces seed, and reproduces vegetation to a limited extent, but reproduction from seed under this system is limited primarily to inferior species having seeds provided with barbs or awns, such as those of porcupine grasses and foxtails, which enable the seed to plant itself naturally. In addition to securing vegetation very slowly from seed under yearlong protection the forage crop is lost through non-use; the old foliage accumulates on the ground, making the range less desirable the following year by decreasing the amount of tender foliage available; and the accumulation of inflammable material is a fire menace.

3. The system of deferred and rotation grazing as here outlined, where the forage is used after seed maturity, accomplishes all that total protection does in restoring the vigor of the vegetation, and the production of a fertile seed crop.

In addition, the forage is utilized with but little or no loss; there is no

old foliage left to interfere with the crop of succulent foliage in the early part of the authorized grazing season when it is so much needed; the danger from fire is less than under yearlong protection; and, more important still, the heavy grazing after seed maturity the first year aids in scattering and planting the seed.

This factor is especially important on sheep range, as it has been found both in the case of natural and artificial reseeding that a band of sheep can be used effectively as a substitute for harrowing in planting the seed.

Experimental figures are lacking for the factor of scattering and planting the seed on cattle range. On range for any class of stock, however, this system could have no disadvantage as compared with total protection from grazing and the general results under practical application on cattle ranges, as on sheep ranges, have convinced the Forest Service that reproduction from seed is secured more rapidly when the range is used under this system than when protected from grazing yearlong.

As a specific basis for these conclusions the following experimental figures and examples under practical application are cited:

On the Wallowa Forest in northeastern Oregon where the original work on this problem was conducted, two sheep allotments, at an altitude varying from 4800 feet to 7800 feet, essentially grass range which had been overgrazed, were handled under the deferred and rotation system and a detailed comparative study made of the results secured under this system, results on similar areas protected against grazing and results on areas grazed under the old practice from July 1 to October 1.

To secure comparative results under varied conditions a total of 25 plots were laid out on the season-long grazed range, 27 plots on the area protected against grazing, and 9 plots on the range under deferred grazing.

Each plot was recharted twice annually, the total number of plants of each species being determined each time.

The comparative results were as follows: During the first two seasons there was practically no reproduction from seed on any of the plots, due to the fact that the vegetation had been previously weakened to such an extent by continued early grazing that no fertile seeds were produced until the plants had regained their vigor by the time of seed maturity in the second year.

In the third year the plots on season-long grazed range showed an average of six seedlings per meter plot, but without exception, they were inferior species of sedge and porcupine grass (*Stipa*); on the lands protected against grazing there was an average of seven seedlings per plot, primarily of porcupine grass (*Stipa*), which plants itself by means of its twisted, barb-like awn; on the lands under deferred grazing there was an average of thirty-nine seedlings per plot (meter square) of which a large percentage were bunch grass (*Festuca viridula*), brome grass (*Bromus marginatus*) and wheat grass (*Agropyron*), valuable forage plants, the seeds of which are large and need to be artificially planted. In other words, the reproduction from seed was $5\frac{1}{2}$ times greater on the lands

grazed after seed maturity than on the areas totally protected against grazing and the reproduction of good forage species was infinitely greater.

These two allotments, each carrying about 1400 sheep, in addition to lambs, and three other allotments on the same forest, mainly grass ranges, were examined after five years's management under deferred and rotation grazing and the estimates of increase in carrying capacity varied from 300 percent for one range where the forage at the beginning consisted of scattered tufts of grass, to 25 per cent for an allotment which was in good, though not maximum condition, when the deferred and rotation management was put into practice.

The estimated increase on the other three allotments were 100 percent, 50 percent and 40 percent.

Further to test the merits of the deferred and rotation system and aid in working out a system of management for badly overgrazed sheep range on the Hayden Forest in Wyoming, a typical area of 20 acres was selected within an allotment of perennial grass range used each year from May 10 to September 15.

The 20 acres was divided into a 19 acre field and a 1 acre field, each fenced with sheep proof fence in the spring of 1911.

During the grazing season of 1911-12-13, the outside range was grazed from May 10 to September 15, but not overstocked; the one acre plot was totally protected against grazing and the 19 acre field was grazed by a band of sheep between August 20 and September 1, each year. To check the report based on ocular observation, that the 19 acre field was in far the best condition in 1913, plots 6 feet square as nearly comparable in topography, soil and moisture as could be selected were laid out and charted to determine accurately the difference in condition and make up of the vegetation on the three areas.

The number and size of each species was determined on each plot.

The results may be summarized as follows: The total number of plants on the area under deferred grazing was 2.1 times the number on the totally protected area and 1.3 times as great as on the area regularly grazed; the number of good perennial forage plants on the area under deferred grazing was 2.05 times the number on the totally protected area, and 2.5 times the number on the area grazed under season-long grazing; seed of the more valuable species showed the average germination for the area under the deferred grazing and the area protected for three years to be about equal, approximately 50 per cent, and for the area grazed season-long only approximately 30 per cent.

The examples given are for sheep range. I have recently made a critical examination of a cattle range on the Plumas Forest in California.

It is made up of well-drained meadow extending up through a fringe of sage brush into pine timber.

Four years ago it was barely carrying 175 cattle, running at large over the whole range.

Three years ago the area was divided into two parts by a drift fence,



OFFICERS 1914

- 1 Doctor Henry J. Waters, President
- 2 W. I. Drummond, Chairman Board of Governors
- 3 Ralph H. Faxon, Executive Secretary-Treasurer

and a year later into three parts by a second fence in order to control the stock and adopt the system of deferred and rotation grazing.

At the close of the present season the steers and dry cows were in fair beef condition and the range has improved sufficiently to justify an increase of 25 head, 14 per cent in the number of stock allowed.

There has been some question as to whether the forage on areas where grazing is deferred until after seed maturity can be used to advantage. On National Forest ranges heavy frosts usually come at about the time of seed maturity and as a consequence the succulent forage consists of only a limited fall growth of green grass.

Stockmen are learning that it is an advantage to have an area of mature, untouched forage for this period. The stock may not hold their plump, round condition as well as where they have more succulent feed, but they harden on the air-dry forage and the grain in the native grasses, and as a consequence are in the best condition to stand the drive from summer to winter range or the shipment to market.

While the results cited have been secured under National Forest conditions which are somewhat different, as a whole, than those on range and pasture lands elsewhere, the principle involved is fundamental, based primarily on the requirements of the forage plants in their growth and reproduction.

Further, it works to best advantage on ranges where the forage is made up largely of perennial grasses, as this class of forage is longer in reaching maturity, and is more subject to being cropped before seed maturity than the more rapid growing weed species.

In addition, the perennial grasses are more palatable and nutritious after maturity than other range plants, thus making it possible to defer grazing on grass lands until after seed maturity, with a minimum loss of forage and meat production.

In view of these facts there seems no reason why the system of deferred and rotation grazing should not bring even better results in the management of pasture lands within the short grass and bluestem territory than on the grazing lands within the National Forests.

The owners of these lands have a great advantage over National Forest range management in that they have exclusive use and can construct the necessary fences for the control of the stock at much less expense than is possible on the remote, rugged grazing lands of the forests.

These lands have the additional advantage of a long season free from killing frosts and should produce a good seed crop of high germination, so essential to revegetation.

Numerous tests of seed from the lower ranges of the forests show a germination of as high as 95 percent, while seed from the high ranges rarely germinates more than 35 percent.

The main drawback of the short grass region is, perhaps, a lack of sufficient, well-distributed watering places, but in the end considerable expenditure for water development is a matter of economy if the proper maintenance of the pastures depends upon it.

• In applying this system of management to any pasture lands the essential steps are as follows: (1) determine the number of seed maturity of the most important forage plants; (2) determine the proportion of the grazing season which remains after the date of seed maturity; (3) if one-third of the grazing period, for example, remains, the pastures should be divided into three parts, of approximately equal carrying capacity and fenced separately, or rather provision made for controlling the stock; (4) the stock should then be held off of one area until seed of the important plants matures. It should then be grazed the first year as close as possible without injuring the vegetation by trampling. In the second year the stock should again be kept off this area until after seed maturity and then allowed to graze it moderately.

Moderate grazing will destroy perhaps 50 percent of the seedlings which have sprung up from the seed crop of the year before, but the use of the forage and the planting of an additional seed crop will more than offset this loss.

Heavy grazing the second year would destroy nearly all of the seedlings and should therefore be prevented.

(5) If the original vegetation is vigorous it should produce fertile seed the first, as well as the second year of protection, and in the third season the protected area should be grazed second, or midseason, and another pasture chosen for deferred grazing.

If the original vegetation has been weakened by continuous early grazing it will not produce fertile seed until the second season of protection and in such case the first area selected for reseeding should be protected the third year until after seed maturity.

The second and third areas should be treated in the same way, and after the rotation is complete early and late grazing should be alternated for each area in order to keep the vegetation vigorous and occasionally plant an additional seed crop.

According to the foregoing the complete outline for range improvement and management of natural range lands in the Western states would be:

1. Limit the number of stock to what the range in its existing state will support, at least in good feeding condition.

2. Avoid grazing any of the area while the ground is wet in spring and the vegetation just beginning growth.

3. Control and distribute the stock by fences, watering places and salt troughs or other means, so as to minimize handling, natural travel or congregating in large herds.

4. Apply the system of deferred and rotation grazing outlined, as nearly as possible.

5. Increase the number of stock as the condition of the range justifies, keeping in mind that they should be turned off in good condition.

DEAN BURNETT:

The next speaker is a well-known authority in livestock in the Middle-West, who has, especially in Kansas, achieved a large measure of success.

I have the pleasure of introducing to you W. A. Cochel, professor of animal husbandry in the Kansas Agricultural College:

Address of Mr. Cochel.

BEEF CATTLE AS A MARKET FOR THE BYPRODUCTS OF GRAIN IN THE SUBHUMID DISTRICTS.

Three crops stand out as predominating in the subhumid sections of the United States.

In the order of their acreage they are grass, wheat, and sorghums.

Little attention has been paid by investigators to the first of these, which is by far the greatest, due in part to the fact that there is no very accurate method of measuring its value or its improvement. This is true not only in the subhumid but also in the humid sections of the country.

No permanent, profitable system of farming has been established in any wide area without grass, which necessitates livestock for its utilization. Whenever grass is entirely eliminated from the farm crops, decrease in yield of all other crops follows, and a discontented, restless, unhappy farming population becomes discouraged.

Until recent years they have moved on into what is known as the virgin prairies where they again followed the same system of breaking the sod, sowing grain, depleting the soil which they abandoned when it became no longer productive. As there are no longer great areas of new land to be brought under cultivation in a wholesale manner, it is now necessary that we begin to improve those which we have already depleted. History shows that the only means by which this can be successfully accomplished is through the use of livestock.

Throughout the great wheatgrowing sections of Kansas and adjoining states, the practice of burning straw is of such common occurrence as to excite little or no comment, except from those who live in sections where the full value of this byproduct of grain farming is fully appreciated. In the spring following a year which has been favorable to the production of forage crops, the same sight may be witnessed in the fields which have been utilized for the production of coarser cereals, such as corn, kafir, milo, and similar grain crops.

This practice was general in western Kansas in the spring of 1913, although within three months thousands of cattle were being shipped out of the same sections because of the inability of pastures to carry stock until the fall sown wheat was capable of feeding them.

I venture to assert that sufficient feed was wasted and destroyed in the state during the winter and spring of 1913 to have fed every animal which was sacrificed on a glutted market until a sufficient quantity was again produced. During this same season at the Hays Station instead of wasting feed, as much of it as possible was stored in silos, which were left intact while dry roughage was utilized for the maintenance of breeding herds, and the remainder stacked in large stacks early in the spring and carried over for future use. The result was that while practically every farmer in the vicinity was compelled to abuse his pasture by overgrazing, finally

to reduce his herds, the station was not only able to maintain its normal number of livestock, but to increase the size of all herds and flocks, which were used to consume the feeds which would have otherwise been wasted.

The system which is recommended is to provide for extremely unfavorable seasons during those years when there is an abundance, in order that the livestock population may be more nearly constant from year to year, eliminating the financial sacrifice which accompanies the marketing of cattle during periods of depression due to large liquidation and restocking when feed is abundant and cattle relatively scarce. In some of the most favored sections along streams, alfalfa can and should be grown, but for the most part cattle should be maintained on grass during the summer, supplemented with silage or dry forage from the sorghums. Kafir has met the conditions of soil moisture and weather better than any other crop when the season is long enough for it to mature. The headed kafir has been extensively used for the winter maintenance of beef-breeding animals and has proved to be equally as valuable as corn stover, which is the basis of winter maintenance rations in the corn belt.

During the past three years we have maintained breeding herds in excellent condition at Hays by feeding twenty pounds of silage per head daily, all of the wheat straw they could eat, and one pound of either cottonseed or linseed meal per head daily. The cost of maintenance during the period of 100 days, from the middle of December, 1912, until the first of May, 1913, was \$4.44 per head for feeds fed, with silage at \$2.66, straw \$.50, and cottonseed cake at \$30 per ton. Assuming that the cost for the earlier part of the year, during September, October and November was the same, the total cost of wintering a breeding cow was \$6.66. The cost of grazing amounts to \$7.50 throughout the larger portion of the grazing section, making the total cost for the year \$14.16. With an 80 percent calf crop, the cost per head would be \$17.70, to which should be added a bull service fee of \$2, or a grand total of approximately \$20 as the food cost for cow maintenance for the year.

From November, 1913, to April, 1914, a similar lot of cows was wintered on kafir stover from the 1912 crop, wheat straw and a limited amount of kafir silage, used as a carrier for cottonseed or linseed cake. On account of the short crop, kafir silage was worth \$4, stover \$2, straw \$1, and cottonseed cake \$28 per ton. Under these conditions the cost of food for wintering was \$5.46 per head, bull service \$2, grazing \$7.50, a total of 14.96 for the entire year, or \$18.70 based upon an 80 percent calf crop. The labor involved amounted to \$2 per head.

From these figures it may be assumed that the production cost of a beef calf will average \$20 in the shortgrass section of western Kansas. At the same time due allowance should be made for the following considerations:

1. In every instance, sufficient allowance is made to insure a profit in the production of the crops used directly for feeding purposes.
2. A market was furnished for kafir stover at \$2 per ton and for

straw at \$1 per ton in the stack, both of which were produced in 1912 when no other market at any price could be obtained.

3. An allowance for labor in winter was made at 17½ cents per hour for man, or 40 cents for man and team at a time when little opportunity for employment is offered.

4. The possibility of diversified farming permits of a more equitable distribution of labor throughout the growing season than is possible when only one crop is produced.

5. The manure produced and properly applied maintains soil fertility and adds humus to the soil, which prevents blowing and erosion.

6. No attempt was made to reduce the cost of wintering by the utilization of wheat pasture.

7. The average value of calves similar to those produced in these experiments has been \$35 per head for the past three years, and promises to remain equally as high for several years to come.

All of these factors add to the profits of beef production very materially, although they are usually entirely ignored. Calves similar to those produced at Hays were handled at Manhattan during the winter of 1912-13 and 1913-14 on rations made up largely of silage with a pound of linseed or cottonseed meal per head daily at a cost of 6.8 cents per day, or \$10.23 for a 180-day period, making the cost for production of a stocker at twelve months of age \$30.82 based upon period when the cost of production was higher than at any other similar period in the last 40 years.

This series of experiments indicates that the maintenance of beef-breeding herds and the production of stockers and feeders is a business peculiarly adapted to the subhumid areas, because of the fact that such production permits the utilization of the byproducts of crops usually grown where rainfall is deficient. The data presented coincide with careful observation of the general farm and ranch practice in the same area, in that the livestock farmers are the most prosperous, their farms are more productive, their homes are more modern, and their credit is better than that of their neighbors who have attempted to farm without livestock.

In order that this method of farming may become more general, the colleges and experiment stations and their agricultural journals, as well as the leaders in such communities should use every possible means of disseminating information as to methods of farming and management which will permit of profitable livestock production, and work out some means of financing breeding operations.

As yet it is impossible for farmers to secure capital through a series of years with breeding herds as security. Adequate means have been provided to secure loans on cattle-feeding propositions, because of the fact that they are concluded in less than a year; but the same men, with the same equipment and feeding materials, are able to negotiate a loan on breeding stock.

This is a problem yet unsolved, and which I leave for you to consider.

DEAN BURNETT:

This concludes our morning session. We shall meet promptly at 1:30; and I ask you to bear in mind the stockyards arrangement for this afternoon.

TUESDAY, OCTOBER 13
AFTERNOON SESSION

PRESIDENT WATERS:

We have with us this afternoon an important member of the United States Forest Service, who, because of other engagements, is compelled to speak to us now. The importance of the work of the Forest Service, especially in respect of moisture-conservation, one of the cardinal tenets of this Congress, is notable.

I now have the pleasure of introducing Smith Riley of Denver, District Forester.

Address of Mr. Riley.

THE RELATION OF FORESTS TO AGRICULTURAL WATER SUPPLY

In taking up the subject of the relation of forests to agricultural water supply, I wish to avoid a controversial attitude, and at the same time to present the opinion of the forester as strongly as possible. It is realized that this subject, especially as it involves the question of the relation between forests and streamflow, has been presented from many angles by different scientists, engineers, and others, and that there is room in a discussion of the subject for many opinions. My object, therefore, should not be to present opinions alone, but as many facts as possible, and, after making my meaning clear, to leave it to you to form your own opinions.

Of the various relations that exist between forests and the water supply, that which has to do with their effect on streamflow is undoubtedly the most important. This is a question which affects directly every irrigator, and affects indirectly nearly every human activity. The forester has formed his opinion regarding the importance of forests in regulating streamflow and preventing erosion from several sources.

Not only does an analysis of the influence of the forest upon each of the different factors affecting streamflow indicate that it must have a marked effect in regulating the character of the run-off, but actual experience demonstrates the same thing. In Europe there are many historic examples of formerly navigable rivers which have become so filled up with detritus and so irregular in their flow in consequence of deforestation at their headwaters as to make navigation impossible. Such countries as France and Switzerland, after centuries of forest destruction, have been compelled to reforest their denuded mountains in order to control the mountain torrents and to retain the fertility of the valleys.

In the United States it is generally recognized by reliable observers

that clearing the forests in mountainous regions is followed by drying up springs, greater irregularity of streamflow, and increased erosion. Comparison of the run-off of various American rivers for different periods made by the Geological Survey and the Forest Service, show that there has been a marged and steady increase in the fluctuation of their flow and in the duration of high and low waters, accompanying the cutting of forests in their upper courses. A careful study of conditions in the White Mountains, recently made by the Geological Survey, established beyond question, for that region at least, that forests have an important influence in reducing the volume and severity of freshets, especially the annual freshets resulting from the melting of the winter snow.

May we not, therefore, assume that what has been established elsewhere applies to our Western mountains, which are the source of so much water used in irrigation? Let us take, as an example, the Arkansas River, which passes through Wichita. This river rises in the mountains of Colorado, as do a number of other important irrigation streams. Within the state of Colorado, and in western Kansas, a large part of its water is taken out into ditches and reservoirs. The report of the State Engineer of Colorado for 1911 and 1912 shows that during the latter year 478,935 acres were irrigated from the Arkansas and its tributaries within the state. The engineer estimates that twice this area may be put under irrigation. The amount of water used in 1912 was 1,338,851 acre-feet, or about 2.8 acre-feet for each acre of land irrigated.

Now let us see what is the source of this water by which 479,000 acres are irrigated. A number of guaging stations have been established along the Arkansas River from near its source in the high mountains to the eastern boundary of Colorado. These give us very reliable information as to the flow of the stream. Let us take the flow of the stream during 1911 and 1912 as representative. Examining the records of the various gauging stations, we find that at Granite, not far from the head of the stream, above which is a drainage area of 425 square miles, the average flow during 1911-12 was 376 second-feet. At Salida, with a drainage area of 1,160 square miles, the flow was 722 second-feet. At Canon City, with a drainage area of 3,060 square miles, the flow was 892 second-feet. At and below Canon City a great deal of water is taken out of the stream, so that it is best that we should not consider the flow at Pueblo and intermediate points, but drop down to Holly, and there to consider the measured flow of the stream, and add to this the total amount of water used for irrigation in the Arkansas drainage. On this basis we find that, if no water had been taken out of the river, the flow at Holly, with a drainage area of approximately 25,000 square miles, would be approximately 2,072 second-feet.

Presenting these figures in another way, we find that for various elevations the run-off per square mile of drainage area is as follows: At Granite, elevation 8,930 feet, 613 acre-feet; at Salida, elevation 7,038, 432 acre-feet; at Canon City, elevation 5,363, 202 acre-feet; at Holly, elevation

3,387, 60 acre-feet. In other words, is it not apparent that the higher, heavily-forested mountains are the principal sources of water supply, when we find that one square mile above 8,930 feet in elevation furnishes enough water to irrigate 219 acres, while the average square mile, for the entire drainage, which is at least one-half prairie and foothills, furnishes only enough water to irrigate 23 acres? If the high mountains are the source of most of the water, as these figures seem to indicate, then is it not of the utmost importance that these mountain areas be protected in such a way as to furnish a perpetual supply?

Now let us explain the records to see what proof we may find of the effect of the forest cover on this water supply from the mountain regions. We are all aware, of course, that the precipitation, especially in the form of snow, is much greater at high elevations than in the low mountains or on the plains. We are also aware that forests grow on the higher mountains because of the abundant precipitation, and that there are certain areas, very high mountain peaks, which bear no timber, yet undoubtedly furnish much of the late water for irrigation. In looking at this question, therefore, we are concerned only with those moderately high mountain areas where forests reach their best development, where the precipitation is from 20 to 30 inches per annum, and where the atmosphere warms up sufficiently early in the spring to cause rapid melting, freshets, and a loss of water for later irrigation purposes.

If we are willing to take the results of the Geological Survey experiment in the White Mountains, as applying approximately to similar forest areas in the Rockies, we find the following facts: Two areas of approximately 5 square miles each were studied. These areas were very similar in every respect except that one had been burned over from one to three times, while the other was covered, to the extent of 80 percent of its area, with virgin forest. During 1912 the streams flowing from these two areas were carefully studied, as was also the amount of snow and rain which fell upon them, and other factors. During the period of rapid melting in the spring, April 2-29, 1912, it was found that snow and rain equal to a water depth of 10.5 inches disappeared on the burned area, while during the same period only 6.8 inches, or 65 percent as much, disappeared on the forested area. During this same period the streamflow from the burned area amounted to 12.874 inches, while that from the forested area amounted to 6.482 inches, or almost exactly one half the run-off of the burned area. It is seen from the above that while the snow was melting, the burned area made a drain upon its stored ground water of about 2.3 inches, while the forested area stored some of its snow water in the ground. This difference, in the mind of the Geological Survey expert, was due to the presence on the forested area of a deep mat of vegetal soil, while the burned area had only a mineral soil, incapable of absorbing and holding any excess of water. Isn't the difference also due to the slower melting of the snow under the forest cover?

The thing of prime interest to us about this experiment is the fact

that during the spring melting period the run-off of the forested area was only one-half of that of the burned area. On this basis, let us see what might happen to the flow of the Arkansas River at Canon City, if all of the 3,060 square miles of forest area above that point were burned or otherwise denuded. We should find the flow during the month of the highest flow (ordinarily June), which in 1911 and 1912, amounted to 2,762 feet, increased to double that amount, or 5,524 second-feet. Similarly, we may assume that the flow during the following three or four months would be reduced by an aggregate quantity approximately equal to the amount which came down in the flood, since that flood caused a deficit in the storage water. Let us assume that 50 percent of this deficit must be made up in July, 30 percent in August, and 10 percent each in September and October. This would give us for July a flow of 890 instead of 2,249 second-feet, and for August 93 instead of the present 905 second-feet. These figures seem impossible, but we have heard of just such things occurring with small streams. Is it not obvious that the amount of land which could be irrigated from the Arkansas would be reduced proportionately, except as immense storage reservoirs might hold the flood water back for late summer use? Is it not apparent that the forests of the mountains themselves comprise the cheapest and best reservoir for regulating the flow of streams?

Furthermore, deforestation of the mountains is followed not only by marked irregularity of streamflow, but also by greatly increased erosion. Everywhere the two go hand in hand. The quantities of sediment and coarser detritus carried by the streams greatly increased the severity of floods, and, by building up the lower channels of the streams, their frequency as well. The evil effects of erosion are even more wide-reaching than this, however, and thousands of acres of valuable farm lands may be rendered worthless by the deposition on them of the masses of detritus brought down from above. Of all vegetative covers forests are generally recognized as the most efficient in preventing the slopes from eroding and the stream channels from filling with silt.

Another great influence of forests, in connection with agricultural water supply, is their effect upon the moisture of adjacent fields. This is a subject which has been exhaustively studied in our own region of the Middle Western States*. In this connection we are not concerned with the influence of large bodies of trees, but of more or less narrow belts, or even single rows of trees, surrounding fields, which we speak of as "windbreaks". The value of windbreaks of forest trees in protecting fields and the mechanical and physical effects of excessive winds, has been proved beyond a doubt. It has been shown that any such belt of timber, in the Middle-Western farming region, pays for itself, and for the ground it occupies, so long as its width does not exceed three times the height of the trees. In addition to this protective value, of course, any belt of trees would yield more or less material of value in the form of fenceposts, fuel, and even timber for construction or lumber.

The beneficial effects of windbreaks are brought about in several ways. First, is the protection from occasional violent windstorms, which may blow down grain crops and render them practically worthless. The direct protection from wind and its mechanical effects is, of course, greatest near the belt of trees, but is appreciable for a distance equal to 20 times the height of the trees. Thus a windbreak 50 feet high would have some influence on wind velocities and forces for a distance of 1000 feet to the leeward.

Closely connected with the protection exerted by windbreaks is their direct influence on the supply of ground water available for agricultural purposes. It is a well known fact that evaporation from any moist surface is carried on at a rate about proportionate to the rate of movement of air over that surface. Consequently, in checking wind velocities the windbreak also checks evaporation. In the study above referred to it was found that exceptionally heavy windbreaks might, at times, reduce the evaporation at points to the leeward by as much as 70 percent of that occurring in unprotected situations. This simply means that the crops growing under this protection had nearly three times as great a moisture supply as those growing in the open. This, of course, extends only over a limited area, and under ordinary conditions the average saving in evaporation over the entire area protected would probably not exceed 20 percent. This, however, is of great importance when the moisture supply goes so low that a small amount means the difference between life and death of the crop.

Another influence of windbreaks was found to consist in the creation of higher day temperatures, and lower night temperatures within the zone in which the air was calmed. This resulted, in all cases examined, in an acceleration in growth, as though the crop had been placed under hothouse conditions. The benefit was especially marked in the case of corn crops.

It is true, of course, that any belt of trees growing next to a field crop, robs that crop more or less of moisture and sunlight. This, however, has been taken into consideration, and the conclusion has been reached that any windbreak of reasonable width will more than pay for the ground that it thus occupies, through its effect in preventing evaporation, etc. In this way the windbreaks in one county, such as the heavily-planted counties of eastern Kansas, save thousands of cubic feet of water, which otherwise would be lost to crops, each year.

We have seen, now, that forests may have several different influences on the question of agricultural water supply. They may help the irrigator by holding back the spring mountain freshet and making the water available when most needed; they may prevent erosion, which increases the severity of floods and frequently destroys the fertility of valuable farm lands; and finally they may help any farmer, when planted judiciously, in protecting his fields from excessive evaporation. Nature has placed these friends of man in almost all regions which are fit for human occupancy, and we should be indeed careful not to disturb nature's bal-

ance by their destruction without thought, or for our temporary gain.

Not infrequently the value of the forest as a protector of the water supply is greater than its value as a source of wood.

* "Windbreaks: Their Influence and Value," Bulletin 86, Forest Service.

PRESIDENT WATERS:

Secretary Faxon informs me that a number of special streetcars, placed at the disposal of the Congress by the Wichita Railway & Light Company, are now at the door to convey us to the Wichita Union Stockyards, where joint sessions will be held with the Kansas Livestock Association at the Livestock Exchange.

The Congress is now at recess for that purpose.

Note: The following telegram from J. D. Jackson, Alpine, Texas, President of the Texas Cattleraisers Association, who had found himself unable to take his place on the program, was read:

Fort Worth, Texas, October 12, 1914.

R. H. Faxon, Secretary,
International Dry-Farming Congress,
Wichita, Kansas.

I regret it is impossible for Judge Cowan or other representative of our association to be present at your livestock sessions.

J. D. JACKSON.

From Judge Cowan

The following communication from Judge Samuel H. Cowan of Fort Worth, Texas, attorney for the Texas Cattleraisers Association, and authority on rate and tariff matters pertaining to the livestock industry, was also read:

Fort Worth, Texas, October 12, 1914.

My Dear Mr. Faxon:

Neither Mr. Jackson nor myself will be able to be at your meeting at Wichita. The Livestock Show is now in progress here at Fort Worth.

We thank you for your kind invitation; and trust you will have a successful and prosperous meeting.

S. H. COWAN.

AT THE LIVESTOCK EXCHANGE

President W. J. Tod of the Kansas Livestock Association, Secretary J. H. Mercer of that association, General Manager D. C. Smith of the Wichita Union Stockyards, and a large committee were in waiting at the stockyards on the arrival of the members of the Congress, and escorted the latter to the Livestock Exchange.

President Tod introduced President Waters, who spoke briefly.

M. M. Sherman of Ellsworth County, Kansas, was then presented.

Address of Mr. Sherman

DRY-FARMING AND LIVESTOCK.

The United States, developed as no other nation ever developed in the world's history, has been a country of diversified production.

Necessity compelled the pioneer to supply most of his needs from his own land, and it may be that this, probably more than anything else, diversified farming which is at the foundation of our wonderful progress. When the strength of the North was measured against that of the South in the War of the Rebellion, the North conquered, and it may be that while slavery played an important part, at the same time, the diversified farming of the North against the more special crop of cotton in the South played no unimportant part in deciding the conflict. No single-product country has ever been able to progress in any way compared with a country of diversified products. This lesson, in its broad general application, should be in the minds of everyone engaged in agriculture in any form in the dry-farming region.

Already, there is under way in the great dry-farming region an extended movement to grow feed for livestock, but this tendency can be, and is, susceptible of enormous extension.

I have seen fairly good crops of sorghum grown in the Sulphur Springs Valley in Arizona. Draws, low-lying places where the soil is good, can be found in nearly all localities where ten acres, 100, and sometimes 1000 acres in one body can be made to produce forage crops suitable for cattle feed.

With a silo, it may not be necessary to use this feed a good grazing year, but as it can be carried over from year to year, it is available not only during bad winters; but, also, in those years of drought summers where neither grass nor anything else will grow. This is a characteristic of the dry-farming region—years of plenty and years of pronounced scarcity. Preparation during the years of plenty for the bad years is a problem in conservation that, generally speaking, the dry-farming region has not attacked. Preparation for the hard times is not one of the characteristics of the great Western people, whether it be in the dry-farming, or in other agricultural region.

While the silo may be the best method of storing and carrying over the forage from one year to another, it is not the only method. It must be remembered, however, that a silo costs money, and the farmers are, many of them, circumscribed in their resources. What they would like to do, and what they can do, are two very different things. I have fed corn fodder that had been in stack two years, and I know it was relished by the cattle. If corn fodder can be carried over in stack, so can any of the varieties of the sorghums if they be well stacked. Again, running any of this forage through a shredder—or an old threshing machine will often times serve in place of a shredder—makes better feed the second than it was the first year. As to its keeping properties, the peth within the stalk that is exposed by the process of shredding absorbs the rain or snow falling upon it so that it can't penetrate within the stack. Provided that it is dry when

put in the stack, nothing in the line of forage will keep better than shredded fodder. Therefore, it is, that the silo is not an absolute necessity.

Still another method that can be employed on the larger ranges where from 500 to 1000 acres of kafir can be grown, is a mill similar to an alfalfa mill, and the kafir corn, head, stalks and all, can be ground the same as alfalfa is ground, which, in this pulverized condition, permits the juices of the stomach to extract the nutrition to a far greater extent than if the forage be fed in the ordinary way of hauling direct from the shock to the cattle. This, however, is too expensive a method to attempt to adopt where the acreage is small, as economic grinding will require an engine of 100 horsepower, and other machinery costing from \$1000 to \$2000.

For my own part, I have great faith in nonsaccharine sorghums, inasmuch as they produce both grain and forage when listed in and not sown broadcast. Also, it is eminently desirable that the dry-farming region raise its own concentrates. Ground kafir is an admirable substitute for shorts. These sorghums not only produce grain, but the forage of the kafir, at any rate, is probably better than the forage of Indian corn. It serves excellently in the silo. Heading the kafir, threshing the heads, and then grinding, will almost render the farmer of the dry-farming region self-sustaining as to concentrates; at least, for the growing animal, be it the calf or the pig, and at the same time, will have the animal well on in the fattening process.

In the production of these animal feeds, generally speaking, unless the soil be very sandy or shallow, as upon a gravel bed, deep plowing is an essential that moisture may be stored in the soil. It is well understood that the rock is only solidified earth. The rock will hold but little moisture; finely pulverized earth will hold a great deal of moisture. Baked or hard soil is of the nature of rock—it has but little and will retain but little of the moisture. Then it is, that the soil must not only be plowed deep, but it must be kept in a condition to retain all the moisture that it has absorbed. The surface must be thoroughly pulverized to stop evaporation. That is done by what is commonly called the maintenance of a dust mulch, a corrugated pulverized surface. This latter, which is not being practiced as much as it should be, is, generally speaking, well understood by our Western farmers. The deeper plowing, however, is not as well understood, is not as readily accepted, and in many instances is combatted.

In regard to firming the soil, the immediate plowing after the harvesting of wheat or other similar grain crop, if there be plenty of rain in July or August after the ground is plowed, may serve sufficiently to firm the ground for fall sowing. These rains do not always come and more often the plowing is not done until shortly before seeding. It is rather likely that the surer way, and doubtless this is the method that will be generally adopted, is to summer-fallow, and by harrowing as frequently as necessary keeping the soil free from weeds and at the same time giving a pulverized surface, giving the ground a chance not only to firm, but to accumulate a year's moisture before the time of sowing. May and June are recommended months for plowing, but in the practical working out, the

time to do this summer-fallowing is when the soil is in good plowing condition, when it will not turn up in chunks.

If it be the idea to raise corn, kafir, milo, or Jerusalem corn, or any of the sorghums for grain, blank-listing to a depth of seven or eight inches in the fall will nearly always put the ground in such condition as sufficiently to store up moisture. In the spring when the ridges are broken it affords an excellent seed-sprouting bed and, also, the ground will be sufficiently firm.

The Indians taught our ancestors how to grow corn, even fertilizing, as we are told by Governor Bradford of the Plymouth Plantation, by putting fish in the hills where the corn was planted. We still can do well to imitate the agricultural Indians of the arid region. Probably hundreds of years before the coming of the white man, the flood waters during the rainy season were impounded in a primitive way and used for irrigation, while the flood was on; the field being duly prepared with ditches, dams, and laterals against the coming of high water. We all know that a good soaking will last a growing crop for quite a time.

The livestock man of the dry-farming region should give up the notion that no farming can be done, and that all his country is good for is grazing. He should also give up the idea that he cannot farm. While farming may not be his principal business, he has the capacity, only choosing to think so, to raise enough to very largely increase the carrying capacity of his range. The carrying capacity of the range may not be measured by the very best years; it ought not to be measured by the poorest years. The carrying capacity of the average year, to say nothing of saving his stock the bad year, can be largely increased by farming a proportionate acreage, at the same time, the fact that the nutrient value of a crop grown on cultivated soil is from five to ten times value of the nutrient value of the native grasses.

To the land owner, the increase in the value of the land developing its agricultural possibilities will more than pay for the labor expended.

Again, it is doubtless far better for the one handling livestock himself to be independent on his range within his own limits of some adjoining farmer, of whom he may expect to buy his products, for this nearby farmer may change his system of farming and produce a crop that is not suitable for livestock.

The converse of this proposition is equally true. The farmer should not attempt to place all of his dependence upon some range man buying what he grows, whose notions and conditions may change with the passing years, and should balance his activities with that proportionate number of livestock that belongs with his farm. The day is fast passing when livestock men can drive out the farmer, and the farmer drive out the livestock man. The day is upon us when the livestock man becomes a farmer and the farmer becomes a livestock man.

As pointed out in the beginning, diversity of products is the goal to be reached.

TUESDAY, OCTOBER 13

EVENING SESSION

Marketing and Rural Credits

PRESIDENT WATERS:

This is the Marketing and Rural Credits session, and it is a very notable one on account of the importance of the discussion, as well as the participants.

Before we get into the regular evening's session, is there any business to be transacted?

DOCTOR WORST:

I move you, Mr. President, that a committee of three be appointed to audit the accounts of the Executive Secretary-Treasurer, and report at the business session, Thursday afternoon.

This motion was agreed to, and later President Waters appointed as members of this committee:

J. H. Worst, North Dakota.

Niel Nielsen, Australia.

H. M. Bainer, Texas.

DOCTOR HUMBERT:

I move you, Mr. President, that a committee of five be appointed by the chair to meet with the executive committee with reference to the advisability of making certain amendments to the constitution.

This motion was agreed to, and later President Waters appointed as members of this committee:

E. P. Humbert, New Mexico.

A. F. Mantle, Canada.

W. M. Jardine, Kansas.

J. H. Worst, North Dakota.

Hector M. E. Pasmezoglu, Greece.

PRESIDENT WATERS:

The Secretary, Mr. Faxon, has some announcements to make.

SECRETARY FAXON:

Attention is called to the fact that Thursday will be Railroad Day at the Exposition and also at the Congress. A distinguished party of railroad officials will be here to attend the morning sessions of the Congress, and to spend the afternoon at the Exposition.

I wish also to call attention to the fact that state awards at the Exposition have been made, as well as awards in other competitions; and that proper consideration will be given this matter tomorrow morning. A citizen of the Province of Saskatchewan, Seager Wheeler of Rosthern, has won the world's sweepstakes in wheat; and S. D. Carpenter of Redrock, Oklahoma, has won the second premium. The sweepstakes premium is the splendid International Harvester Company of America's 6-horsepower engine, and presentation of it, through A. F. Mantle, Deputy Minister of

Agriculture for Saskatchewan, will be made to Mr. Wheeler from this platform in the morning.

The first premium among states has been awarded to Arizona, and the beautiful silver trophy offered by the Chicago Association of Commerce will be presented by its official, E. E. Gore, to Arizona.

The state of Colorado was awarded the second premium.

Also the Congress will please take notice of the splendid program for International Night, Wednesday night, in this hall, when representatives of ten foreign countries will deliver appropriate and interesting messages.

PRESIDENT WATERS:

It is a matter of sincere regret to the Congress that the very able Secretary of the United States Department of the Treasury, Mr. McAdoo, was unable at the last moment to be present. It was only stress of important official business, incident, I might say, largely, to the very discussion of this particular session, that kept him in Washington.

I wish to read this message from Secretary McAdoo:

R. H. Faxon, Secretary

International Dry-Farming Congress,
Wichita, Kansas.

Regret exceedingly that it is impossible for me to be present at sessions of the International Dry-Farming Congress. Great pressure of public duties makes it necessary for me to remain in Washington at this time. I send you and your associates my best wishes for the success of your Congress.

W. G. McADOO,
Secretary of the Treasury.

I also wish to read this message from Charles J. Brand, Head of the Office of Markets, United States Department of Agriculture:

R. H. Faxon, Secretary,
Wichita, Kansas.

Acknowledging your telegram, I have authorized Dr. T. N. Carver, representing rural organization work, and am further designating him to present marketing and distribution investigations.

CHARLES J. BRAND.

I now have the pleasure of presenting to you as the presiding officer for tonight and for this very important session, Edwin L. Holton, professor of rural education, Kansas Agricultural College, and himself no mean authority on the question under discussion tonight.

PROFESSOR HOLTON:

President Waters took the opportunity a few minutes ago to step here in front of me and speak to the two men who are here on the platform with me and assured them that there would be but two speeches here tonight—and said it loud enough for me to hear!

I know President Waters just well enough to know what he meant, so I am going to live up to it.

I have felt, as all of you, that this meeting is just as important as, if not more important than, any we have had.

We have talked about better farming and better production and we all believe in it, but the business side, we all believe, can be improved upon; and I am glad to know we have with us this evening two of the best men in the United States to discuss the question.

A short time ago when the President of the United States, through his Secretary of Agriculture, decided to organize the Office of Rural Organization in the Department of Agriculture, he looked all over this country for the best man for the place.

He finally found him, but had a great deal of trouble in getting him released at Harvard University, but that institution finally decided to give part of his time to the country at large.

It gives me, I say, great pleasure to introduce to you Dr. Thomas Nixon Carver, Professor of Economics, Harvard University, who will speak to us at this time upon the subject of "Marketing and Rural Credits."

Address of Doctor Carver

MARKETING AND RURAL CREDIT.

They who cannot or will not work together are the natural and, one might say, the legitimate prey of those who can. Whether we like it or not, it is a law of life, a part of the economy of nature. There is no use kicking against it; the only thing to be done is to conform to it. Unless we can manage to work together with our fellows we must expect to be preyed upon, governed, or exploited by those who can.

No people ever succeeded in governing themselves until they were able to work together. Until they learn that, they will be governed by someone else, either an outside power which subjugates them, a ruling class within their own members, or a boss. So long as they quarrel among themselves or work at crosspurposes, others who have learned the art of working together will rule and exploit them. Look at the Turks and the way they have ruled with a rod of iron over twenty times their own number of unwilling subjects. The Turks were united, their subjects were temperamentally unfit for combined action. How quickly the Turks were beaten when their enemies worked together, and how quickly they may return to power if their enemies remain divided.

It is true in business as in government that the people who work together will rule or exploit those who work at crosspurposes. That is one thing which ails the farmer at the present time. It is not necessarily true that farmers are more cantankerous than other people, though it sometimes seem so. But there are so many of them, they are so widely scattered, and they are so much more expert in dealing with the forces of nature than with the forces of society, that it is physically more difficult for them to work together than it is for other classes. However, these

natural obstacles in the way of united effort must be overcome by a greater wisdom and moral discipline than other classes possess; otherwise the farmer will always be at a disadvantage. That is what wisdom and moral qualities are for—to overcome difficulties.

Now we need not waste any sympathy on those who will not or cannot work together. They get what they deserve. Of course, we all have our own opinions as to what a good man or a bad man is like. We generally call him a good man who possesses the qualities which we admire, which is very likely to mean the qualities which we think that we ourselves possess. Looked at broadly and impersonally, however, the essential difference between good men and bad men is that the former are very careful of their own obligations and other people's rights, whereas the latter are very particular about their own rights and other people's obligations. Every great moral teacher has tried to make good men by telling them of their obligations and not of their rights. We are naturally so much inclined the other way that this is necessary in order to restore a proper equilibrium.

It is rather obvious, is it not, that people who are careful of their own obligations and other people's rights are easy to get along with? A community made up of such people can always work together. On the other hand, people who are very particular about their own rights and other people's obligations are hard to get along with. A community made up of such people can't work together at all. In our impatience we are sometimes tempted to say that such people have no rights and deserve to be exploited. However, the question becomes complicated when we have a community made up in part of people who would like to work with their neighbors and in part of people who will not.

The foregoing is written to show how closely the problems of organizing rural interests is bound up with the question of religion and morals. Unless the right moral influences are at work creating the spirit of working together and mutual helpfulness, no effective organization will be possible. The church, the school, the religious press, and every other moral agency must begin at the bottom by teaching people to be careful of their own obligations and of the rights of others, and overcome the tendency to be insistent upon our own rights and other people's obligations.

Some of you may belong to that large class of Americans who are interested in athletics. If so, you understand pretty well what teamwork means. You also know that an aggregation of excellent individual players who work at crosspurposes is not likely to succeed against a team of ordinary players who work together with one spirit and one will. If there is possible good that can come out of the horrible European war, it will be the lesson of organization, of teamwork, of discipline; the lesson that victory comes only to those who work together in the interest of the whole; where the individual will is subordinated; where the individual does a great many things in the interest of his group which, in his own interest he would rather not do. In the words of Kipling.

"The strength of the pack is the wolf,
And the strength of the wolf is the pack."

Every aspect of our present agricultural problem is a problem of organization. The problem of securing a larger agricultural product is, at bottom, a problem of securing a higher profit in what the farmer grows. That, in turn, is the problem of securing him a better price on what he has to sell, and a lower price on what he has to buy. Farmers are the only large class who uniformly sell at wholesale and buy at retail. Intelligent organization is the one thing which can reverse that process.

How many people are there, outside of the farming classes, who realize how definitely the volume of agricultural production depends upon the prices which the farmers get for their products? During the closing years of the last century, England was suffering from agricultural depression. In 1897 a Parliamentary commission was conducting inquiries into the state of agriculture and the reasons therefor. A great deal has been said about intensive agriculture and the increase of crop yields as an offset to the low prices which products were bringing. The sublime intelligences which set forth this theory did not seem to be blessed with even a sense of humor. Otherwise, they would have seen the absurdity of trying to increase the supply of farm products as a remedy for low prices.

Sir John Lawes, probably the greatest promoter of agricultural sciences in modern times, was called before the commission and was able to prove conclusively that, as you increase your yield beyond a moderate amount, each bushel added to the yield costs you more and more, and that the last bushel so added always costs you more than any of the others. He also showed that, when prices were low, the individual farmer must reduce, rather than increase his yield because, under such intensive cultivation as will force a high yield, the last bushels would then be produced at a loss.

Nothing but high prices will justify the farmer in trying to force a high yield from each acre cultivated, since, as he clearly showed, the extra bushels added to make the high yield were always produced at an extra cost.

Not only does it take an increased cost to increase the yield per acre, but, normally, an increased acreage involves increased cost. Land differs in its productivity, and the cost of production per bushel is greater on one acre than on another. When prices are low it only pays to cultivate the better acres, or those on which the cost of production can be kept below the price at which the product will sell. But when prices rise, it then pays to cultivate inferior acres, and it pays under no other condition whatsoever.

Here we have, therefore, one of the most important laws of agricultural economics. As prices fall, not only must the farmer reduce his yield per acre, but he must reduce his acreage, if he would avoid bankruptcy. He must reduce his yield per acre to the point where the last bushel forced from the soil costs no more than the price which he gets for it, and he must reduce his acreage, keeping the better acres in cultivation and re-

jecting the poorer, to the point where the poorest acre cultivated can be made to yield some bushels at a cost no greater than the price which they will bring.

When farmers generally do this, and they who do not will speedily be eliminated through bankruptcy, the result is not only a reduction in the yield per acre, throughout the country, but also a reduction in the acreage in all old and well-settled communities. New communities where there is virgin land to be had for the asking, may still attract settlers. In fact, the presence of vast acres of this virgin land, rapidly settled and reduced to cultivation, has been, during the last half of the Nineteenth century, a cause of the low price of farm products. The settlers were not farming for profit, but farming to make a living. Their profits came through a rise in the value of the land which cost them nothing. This frontier condition, however, we must now begin to regard as temporary and abnormal. We must henceforth base our calculations and our agricultural policy on the permanent and normal conditions of old settled communities.

Inquiries made by Secretary Houston show that, even within the humid belt, only a fraction of the tillable land is under cultivation, and of that which is under cultivation, only a fraction is yielding satisfactory returns. This is easily explained by the fact of low prices for farm products, in the past, which low prices were due in large part to the rapid settlement of virgin land, together with the economic law just explained. Prices have been so low that farmers did not find it profitable to try to force a higher yield per acre, which, as shown above, involved high cost of production. Moreover they have found it profitable only to cultivate the more productive acres, the acres where the cost of cultivation was lowest, leaving the less productive acres untilled.

Now that prices are rising, we may expect these conditions to be cured automatically, provided hindrances be removed, and provided time be given. The habits of 50 years can not be quickly changed by any farming community. As prices rise, however, not only can each farmer afford to cultivate his land more intensely, thus forcing a larger product per acre, but acres which were formerly unprofitable will become profitable to cultivate. Several difficulties will retard progress in this direction. In the first place, the scarcity of good farmers is a hindrance. Perhaps it ought to have been mentioned earlier in this discussion that, not only does land differ in productivity, but farmers as well.

The effect of low prices is not only to force the poorer acres out of cultivation, but also the poorer farmers out of business. Only the men who can produce at lowest cost, will remain in business. If then, things start upward, the supply of good farmers is scarce, prices must rise until poor farmers can succeed, before agricultural production can expand very rapidly.

In the second place, in order that the farmers of the present may expand their operations, both by cultivating their land more intensely and by cultivating lands which were formerly unprofitable, and in order that new farmers who could not succeed before may now succeed in the busi-

ness, the cost of farm supplies must be kept down. If everything which the farmer has to buy rises in price as much as what he has to sell, his cost of production rises as much as his gross income, and he makes no more profit than before.

It is, therefore, of the utmost importance that the farmers be encouraged to buy at least the raw materials of their business at wholesale rather than retail. By the raw material of farming is meant such things as machinery and tools, fertilizer, seed, lumber and building materials, and fuel. Any organization which attempts to exploit farmers in these fields, and add to the cost of these materials, adds to the cost of producing crops. This has the same effect in the depression of agriculture as a fall in the prices of farm products.

Since capital is coming to play such an important role in agriculture, the cost of credit is coming to be an important factor in the cost of growing crops. This again, affects agricultural expansion preciously as does the price of farm products. That is to say, poor credit facilities and a high interest rate will depress agricultural production as surely as a fall in the price of farm products. On the other hand, good credit facilities with a low interest rate will stimulate agricultural production as surely as a rise in the prices of farm crops. The poor credit facilities and high interest rates of the present time must be regarded as a third obstacle to the proper expansion of our agricultural production, helping to counteract the stimulating effect of high prices.

How can a farmer possibly get credit on easy terms unless he has a good basis for credit? This question is asked more frequently than any other by skeptics on the subject of rural credit. Of course, there is only one answer: He can not. But it is too often assumed by people who pride themselves on their hard-headedness, and who fail to distinguish between hardness and impenetrability, that the only good basis for credit is property or collateral. Real financiers have always seen deeper than this; but many of the rank and file of those who deal in securities, credit, and collateral are not financiers of any kind, either great or small, though they imagine that they are. They are sometimes unable to see beyond the things which clutter their desks and fill their pigeon-holes. To such men, the suggestion that character may be satisfactory basis for credit doubtless seem rather humorous.

The suggestion loses its humorous quality when we consider its fundamental importance. Unless honesty is, or can be made, an advantage in business, honest men can not generally win against rogues in business competition. The result will be that rogues can never be eliminated from business. It is difficult to see how honesty can have any greater advantage over dishonesty anywhere than in the field of credit. Unless the honest man can secure credit on easier terms than a dishonest man, where does honesty pay? Of course, men ought to be honest whether it pays or not, but this kind of a preachment is not going to eliminate dishonest men from business. So far as collateral is concerned, a rogue may have it as well as a saint.

The possibility of making character a basis for credit is of peculiar and vital importance to our agricultural development. The men upon whom we must depend for the future expansion of our agricultural production haven't much else. The well-to-do farmer, who has already accumulated a considerable fund of property, is not the farmer who is likely to clear and reclaim new land, and bring under cultivation the vast area of tillable land both East and West, North and South, which is still untilled. This gigantic task will be performed, if at all, by young men who have little except their hands and their pluck and determination. Such were the men who reclaimed and subjugated the lands now tilled, and such will be the men who reclaim and subjugate the lands still untilled. Such were the men who built the rural homes in which the best of our present population was nurtured, and such will be the men who build the rural homes in which the best of our future population will be nurtured. It is through such men that our financial interests must work if they are to be of the greatest use to the agriculture and the rural civilization of the future.

The farmer who is to cultivate the present untilled area has one problem to face which did not worry the pioneer farmer of the past, though the pioneer farmer had a good many which the farmer of the future will not have; that is, the problem of supplying himself with capital. Most of the land upon which a farmer could begin growing crops without a considerable preliminary expenditure of capital, has already been brought under cultivation. That which remains requires such an investment as pretty generally to exclude the homeseeker who has nothing but his own labor to invest. Unless some method can be found which will enable him to supply himself with the necessary capital, farming will cease to be an opportunity for the homeseeker in America.

So generally is this fact understood that some students of the problem have concluded that the day of the small farmer is ended, and that hereafter we must depend upon the large capitalist farmer or the farming corporation. That would be a pity. Where the two have equal opportunities, the small or middle-sized farmer has always beaten the big farmer and the farming corporation in competition. There are only two conditions under which the big capitalistic farmer has won out. The first is where he has had a large supply of cheap labor, such as slaves, or gangs of coolie laborers, which he could direct and control. The independent small farmer who works with his own hands has then found himself compelled to compete with those cheap laborers, and he has had a "hard row to hoe." The other condition is where the big farmer, or the farming corporation has had some advantage in bargaining over the small farmer. If he can buy his supplies to better advantage, if he can secure capital on more favorable terms; if he can sell his produce to better advantage, he may succeed in competition with the small farmer. But when it comes to the real work of production, as distinct from bargaining—that is, as distinct from hiring labor, borrowing capital, buying supplies, or selling produce—the small farmer can beat him and eventually run him out of

business. That is to say, as a producer the small farmer has no equal. As a bargainer, he is often at a disadvantage.

From the standpoint of the statesman, efficient production is more important than efficient bargaining. Something should be done, therefore, to put the small farmer, who has proved to be the more efficient producer, on an even footing as respects bargaining with the large farmer. If that can be done, we shall enable the small farmer to flourish, and through him we shall have the most efficient agricultural production possible.

One of the best ways to begin is to find some plan which will enable the small farmer to borrow capital on terms approximately as easy as those which the big farmer can secure. If the small farmer lacks both character and collateral, it is difficult to see how anything can be done for him. But if he possesses character, there is a way out of the difficulty.

By character is meant the possession of such economic virtues as industry, frugality, sobriety, forethought, and honesty. Let us suppose that a certain farmer, Jones by name, possesses these virtues, that he is willing to work and to save, that he is sober and forehanded, and that he will always pay his debts if he can possibly raise the money. But there's the rub! Can he raise the money to pay a debt when it is due? If he can not, it is unsafe, no matter how honest he may be.

Here is where the banker may come in and amply justify his existence. It is not enough that he sit in his office and scrutinize the security and collateral of would-be borrowers. That is the job of a cashier, or some one without discretion who must follow fixed rules. It is the banker's job to see that the money which Jones borrows is so used as pretty surely to provide him with the money with which to pay his debt when it is due. By this is meant that the banker's function is to finance productive enterprises, and his first qualification is the ability to decide what is and what is not a productive enterprise. That is what a good investor is. The banker, especially the country banker, ought to be a good judge of investments. There may be room for a finer differentiation of functions in a city, where some bankers may be financiers, and others mere custodians of funds, to receive deposits, on the one hand, and lend them out on good security on the other. But a country banker must be both.

Now, if our country banker is a good financier, that is, a good judge of investments, one who can tell what enterprises are likely to succeed and what are not, he can be of great service to Jones. That is where Jones is weak. He has probably had little training or experience in that direction. His expertness lies in other fields. He may be an excellent judge of livestock, a good hand at growing corn, cotton, or wheat, but he has not, more's the pity, been trained in the keeping of cost accounts. His investments are therefore largely guesswork. He **thinks** that he would like to have this or that—a purebred bull, a few dairy cows, some brood sows, a silo, some tile for the drainage of his land, a new barn, etc. If he could get the money, he would have them. But it is hazardous to

spend good money for things which one only guesses he may pay. It is, therefore, hazardous to lend money for such a purpose.

Now if the banker, with his expertness in the matter of investments, could form an alliance with Jones, with his expertness as a grower of crops, we should have an ideal arrangement. The banker should have studied for years the investments of hundreds of farmers in all the surrounding country. He ought, therefore, to have pretty clear ideas as to whether a silo will be money in Jones's pocket or not; whether a purebred bull, or a herd of dairy cows, will provide Jones with enough money to enable him to pay back a loan, and leave him a profit besides. If so, it is safe to lend him the money. Being honest, Jones will pay his debt if he can possibly raise the money. The purpose for which he borrowed the money being a profitable one, he will have the money. And there you are.

It is, of course, much easier for a banker to sit in his office and scrutinize the notes offered, their security, or the collateral on which they are based. It is a much harder job to estimate Jones's character, and to determine whether it will pay Jones to borrow or not. Character is not self-registering. Therefore it requires judgment and discretion on the part of the lender if character is to be made a basis for credit. But while this job is harder, it is infinitely better worth doing. Besides, the banker who performs this function will be an active builder of agricultural prosperity in his community. In the end, it will add to the prosperity of bankers because of the increased volume of business, and the greater wealth and prosperity of the entire community. After all, that is what banks exist for. Agriculture does not exist for the support of banks. Banks exist for the support of agriculture and other industries.

Bankers owe it as a duty to the country to see that the capital which they control gets into the hands of those who can make the best and most productive use of it, and that it is used for productive rather than for unproductive purposes. Suppose that on an irrigation project, water were used on poor land, where it would not produce much, merely because the owner were able to pay for it, while good and highly productive lands were deprived of water. That would clearly be a waste of good water. The total productivity of the project would be increased if the water were put where it would produce the most, that is, where the land would respond most abundantly. It would be an equally bad waste of water if a poor farmer were permitted to use a quantity, merely because he were willing to purchase it, thus depriving some better farmer, who could produce more with it. Again, it would be a waste of good water if it were allowed to be used in the irrigation of crops which didn't pay, while highly profitable crops were suffering for water.

It is similarly a waste of good capital to allow it to be used by less productive men when more productive men might use it, or for a less productive purpose when it might be used for more productive purposes. The productivity of the would-be borrower does not always depend upon the amount of tangible property or collateral he can put up as security,

nor does the productivity of the purpose for which he wishes to use the borrowed capital depend upon that kind of security. In order to secure the maximum economy of capital, which is the banker's function, he must, therefore, look beyond the tangible security, and scrutinize the character of the borrower and the purpose for which he wishes to borrow.

The banker who secures an economic use of the capital which he controls is one of the most productive members of his community, contributing largely to its prosperity. The banker who does not secure an economic use of capital is a parasite, living off the community, and contributing nothing to its prosperity. He does, of course, help to secure an economic use of capital when he merely borrows, or receives deposits from those who have no immediate use for their capital, and lends to those who do. But he should go further than this, and see to it that the capital which he lends is put to a productive rather than to an unproductive use.

One of the most important of all economic problems is the preservation of the prosperity of the small farmer, who does most of his own work on his farm. His salvation depends upon his ability to compete with the large farmer or the farming corporation. Aside from the question of securing credit, two things threaten to place him under a handicap and to give the large farmer an advantage over him in competition. If these two things are allowed to operate, the big farmer will beat him in competition and force him down to a lower standard of living and possibly to extinction.

One thing which would tend in that direction is a large supply of cheap labor. The small farmer now has an advantage because of the difficulty which the big farmer has in getting help. So great is this difficulty that many of the bonanza farmers are giving up the fight and selling out to small farmers. That is, the big farms, the farms that can only be cultivated by gangs of hired laborers, are being divided. Give the owners of these farms an abundant supply of cheap labor, make it easy for them to solve the problem of efficient help, and they will begin again to compete successfully with the small farmer who, because he does his own work, has no labor problem. If we can keep conditions such that the capitalistic farmer has great difficulty in getting help, the small farmer will continue to beat him in competition, and the bonanza farm will continue to give way to the one-family farm.

One thing which threatens the prosperity and even the existence of the small farmer is the handicap under which he finds himself in buying and selling. The big farmer who can buy and sell in large quantities and also employ expert talent in buying and selling, and in securing credit, has an advantage over the small farmer who must buy and sell in small quantities and give his time and attention to the growing of crops rather than to selling them. Much of the supposed economy of large-scale production even in merchandising and manufacturing, is found, upon examination, to consist wholly in an advantage in bargaining—that is, in buying and selling. When it comes to the work of growing

farm crops, as distinct from **selling** them and **buying** raw materials, the one-family farm is the most efficient unit that has yet been found.

But the big farmer can beat the individual small farmer in buying and selling. It would seem desirable, from the standpoint of national efficiency, to preserve the small farm as the productive unit, but to organize a number of small farms into larger units for buying and selling. Thus we should have the most efficient units both in producing and in buying and selling.

If this is not done, the only farmers who can enter successfully into the production of agricultural specialties, where the problem of marketing is greater than the problem of producing, will be the big capitalistic farmers. The small farmer may hold his own in the growing of staple crops, in which field the problem of economic production is perhaps greater than that of efficient marketing. The reason for this is that there is a well-organized market for staple crops, and the problem of marketing is, therefore, somewhat less difficult than in the case of agricultural specialties. But even in the growing of staple crops the small farmer will have a hard time of it if he is forced to compete with the big farm when it is cultivated by gangs of cheap laborers.

The two worst enemies of the small farmer are the opponents of cooperative buying and selling on the one hand, and the advocates of enlarged immigration to the rural districts on the other. The latter would help the big farmer in the **buying** of labor for his farm, and reduce the price of the small farmer's own labor when he undertook to sell it in the form of produce.

There is a story of an aged savage who, after having lived in civilized communities most of his life, returned to his native tribe in his old age, saying that he had tried civilization for forty years and it wasn't worth the trouble. Much of the philosophy of civilization is summed up in that remark. Civilization consists largely in taking trouble. Genius, in the individual, has been said to consist in the capacity for taking infinite pains in one's work. It is this capacity which marks the superior race as well as the superior individual. They who find the taking of pains too burdensome to be borne, will naturally decide that civilization is not worth the trouble. They who do not find it so very burdensome to take pains, will naturally decide that civilization is worth the trouble, and will therefore become civilized.

This principle applies to every stage of civilization and progress. The greatest advancement is made by those who are capable of taking greatest pains. It applies especially to agricultural progress. It is more trouble to select than not to select seed, and to select it in the field than in the bin. It is more trouble to test cows than not to test them, to keep accounts than not to keep them, to diversify or rotate crops than not to diversify or rotate, to mix fertilizers intelligently than to buy them already mixed, to cooperate with one's pig-headed neighbors, especially if one is oneself a little pig-headed, than to go it alone. It is also more profitable. In

all these and a multitude of other cases, it is found that it pays to take trouble.

There is probably no part in the farmer's business where this needs to be so much emphasized as in his buying and selling. It is so much less trouble to buy all one's supplies at retail as they are needed than to plan ahead and buy at wholesale; and to sell one's products at wholesale and in bulk to the nearest buyer than to work out a better marketing scheme, that this practice of buying everything at retail and selling at wholesale has become almost universal. It takes a very rich soil, or very hard work on the farmer's part, or both, to make up the losses resulting from this system. The farmer is becoming, almost in the same sense as the manufacturer, a buyer of raw material such as fertilizers, seeds, foods, machinery, livestock, etc. What manufacturer would expect to prosper if he depended upon the retail stores to supply him with raw materials as they were needed and at retail prices? How many manufacturers would expect to prosper if they did not have selling agencies but waited for buyers to come around and offer to buy their products after they were finished?

Of almost as great importance is the question of making the farm garden, poultry yard, orchard, and dairy, support the farmer's family. All these things require the taking of trouble. It is less trouble to put all one's time on a money crop, to haul it to town and sell it, and to haul from the store everything which the family consumes than to give attention to gardens, fruits, poultry, pigs, and cows. It is also less profitable. The products which the farmer's family consumes are sold to the best market in the world. The farmer should credit to the garden, the orchard, the poultry yard, the cow, and the pigpen, the retail prices which he would otherwise pay for food, not half so good, bought at retail.

Needless to say, these things must be carefully planned and managed. That requires the taking of trouble. Farmers who are not capable of, or willing to take pains in planning and managing these parts of their business will probably do quite as well by going on in the old way of hauling all their stuff to market and hauling home again the goods which the family consumes. But their lack of prosperity will be due to the fact that, like the aged savage already referred to, they have concluded that civilization and progress are not worth the trouble.

But after all, when one once gets accustomed to taking pains it ceases to be painful to keep on. It is only the beginning from which we shrink. When one gets into the habit of keeping accounts, of rotating and diversifying crops, of making the farm feed the family, and running cooperative enterprises, it is not half as much trouble as it was feared that it would be. The real test of a man's quality is his ability to **begin** taking pains.

Our branch of the human race has not yet demonstrated its ability to live in cities. We have been a pioneering race for something like 2000 years, and no one knows how much longer. It is probably harder for a race to change the habits of its lifetime than it is for an individual. This habit has made us an outdoor race, whose chief characteristic is strenuous

muscularity. Such a race degenerates rapidly whenever it attempts to live an indoor life of bodily ease and luxury. It is always at its best when it is pioneering—when it is obeying the first command written in its sacred book: “Be fruitful, and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.”

We have all heard stories of the children of certain families who hang around home waiting for the patrimony and then quarrel over distribution. Over against despicable examples of this kind we have the more robust and inspiring examples of those children who go out into the world and create families and patrimonies of their own instead of quarreling over their share of the estate. When a race ceases to be a pioneering race, that is, when, instead of going out to find new opportunities, the children of the race hang around the older centers of civilization waiting for the accumulated riches of past generations, they generally fall to quarreling over their distribution. This is even more despicable than for the children of a family to wait for their patrimony, and it is a more certain mark of degeneration.

Much of that which goes under the euphonious name of social reform is merely a symptom of this kind of degeneration. Its home is in the cities, it springs from urbanized minds, and its prophets are mainly members of urbanized races. Strong, robust, self-disciplined, individualistic men are never exploited. If they do not like their treatment in one place, they go where there is land, where they can be independent. Weak, whimsical, timid, gregarious men, who are afraid to get very far from the herd, are always exploited. They can not even be truly organized. They can be herded together as mobs, brow-beaten by their own leaders, excited to spasmodic group action, but so far as constructive, consistent, united action is concerned, it is beyond their power. Only self-disciplined men, capable of controlling their impulses, willing to suffer loss for a principle, but capable of working together with their fellows for distant ends, either with or without leaders, are capable of genuine organization. Such men can not be exploited.

Another symptom of the degeneration which comes to our race from city life is “class consciousness.” Once upon a time, there was an important dialog between a man from the city and a man from the country. Please remember the important fact, commonly overlooked, that the one was from the city and the other was from the country. The man from the city asked, “Who is my neighbor?” Such a question would not occur to a real countryman. He has no doubt as to who his neighbors are. But a man from the city does not always know. He is inclined to consider whether they are members of the same occupation, profession, or religion as himself, or whether they are people with about the same income who can entertain on about the same scale as himself, or whether they are the people who live within easy reach. The man from the country who answered this question by telling the story of the good Samaritan, was

in the habit of emphasizing the fundamental relations of life. The geometrical relations are very much more fundamental than are the class relations. In fact, all class consciousness, such as was shown by the priest and the Levite, is contrary to the scheme of life and social relations which this man from the country came to establish. The wisest social workers even in our cities are beginning to realize that the neighborhood must be the basis of a genuine reconstruction of city life. I once heard an ardent social reformer admit, rather boastfully it seemed to me, that of several hundred people who lived in the same building as himself, he did not know even the name of a single one outside of his own family. A more stupendous fraud could hardly be perpetrated than for such a whited sepulchre to pretend to be a social reformer.

Broadening the idea of neighborhood we have the principle of territoriality as the basis of nationality. Enlarge the neighborhood sufficiently, and we have the territorial group called the state. Several times in the history of the race other groups than the territorial group, other organizations than the territorial state, have claimed the loyalty of the individual. Whenever the average citizen is more loyal to another group, say a church, a party, a labor organization, than to the state, the state has disappeared. That is to say, when he will obey the orders of some other organization rather than the law of the land, the territorial state has already been subverted. Needless to say, these other groups, based on a common religion, or a common occupation, which sometimes stand as rivals for the loyalty of the people against the group, commonly called the state, which is based on the occupation of the same territory, have their origin in cities. Indoor people are the only ones who can easily forget the principle of territoriality and the law of the land.

Pioneering in this country needs redirection. During the past decade, it has taken thousands of our most valuable citizens beyond our own borders to enrich the life and increase the power of other nations. In place of these sturdy, self-reliant, courageous citizens, who are willing to face hardship, and capable of creating their own opportunities, we are receiving in vast numbers men who prefer to go where opportunities have already been created for them by the pioneering activities of others, to fill positions created for them by the business enterprise of a sturdier race. In other words, we are losing men who can create opportunities and are receiving men who are only capable of filling opportunities created by others. This means that we are in process of becoming an urbanized, and therefore a degenerate nation.

The difficulty is not, as some seem to think, that we do not distribute our immigrants. They probably do better to stay in the cities because they would be useless on our farms. Our farmers would not hire many of them, and they have not the qualities which make pioneer farmers. Besides, if we could send more of them to the country and keep them there it would only accelerate the movement toward Canada and the cities. The stream of population is moving away from our farm regions. It is

much more important that we retard the flow of that stream than that we try to turn a new stream toward the farms. If the water were leaking out of a reservoir which we wanted to keep full, it would seem wiser to stop the leak than to try to pump more water in, which would only increase the pressure and accelerate the leakage.

While so many thousands of our farmers are emigrating beyond our boundaries in search of more land, it has been ascertained by Secretary Houston that not more than 40 percent of our tillable land is actually under tillage, and of this, not more than 15 percent is actually yielding satisfactory returns. If the untilled 60 percent were all poor land, while better land could be had for the asking just over the boundary, it would be difficult to convince many of these farmers that they ought to stay at home and cultivate this poor land. But there are reasons for believing that this is not generally the case. The lands which they are seeking abroad have two characteristics which fit them for isolated and individual farming. The soils are new and fertile and therefore require no investment to bring them to a high state of productivity. Again, they are suitable for the growing of a staple crop—wheat—for which there is a ready sale in a highly organized market. Thus the marketing of his product takes care of itself.

Much of the land still untilled in this country is capable of a high degree of productivity, but will require some investment of capital to bring it to that state. The problem of financing the farmer during this period of waiting must be solved. Again, much of this land is suitable for mixed crops and agricultural specialties rather than for one or two great staple crops. The products of this kind of farming do not market themselves. It requires organized effort on the part of the farmers; therefore, the problem of marketing must be solved before these lands will attract farmers and keep them from going abroad. Here is a new kind of pioneering which challenges the young men and women of our race.

The challenge is more to the young women than to the young men. They will have the harder half of the burden and they will find less to attract them. Most young men are attracted by an outdoor life, and even physical hardships do not deter them, if there is a chance for real achievement, together with genuine comradeship. That is what a soldier's life involves. But no one would want to be a soldier if he were deprived of comradeship and if there was no chance of achievement. Young women are not so strongly attracted to this kind of life. Nothing but religion will sustain them in it, and unfortunately women are, contrary to common belief, far less religious than men. The reason for this common error is that what we commonly call religion is of a namby-pamby sort. There is little in it to sustain the spirit of a crusader, which is characteristic of any genuine religion—the only kind which appeals to men.

To conquer our untilled lands, to subjugate them and force them to yield food for the feeding of a great people, to build great families with high ideals in order that we may become a great people worthy of being fed, is a task which ought to fire the ardor of our young American cru-

saders as no old Crusader's zeal was ever fired. It is a vastly greater task and vastly more worthy of accomplishment than any which the old Crusader faced.

We have, therefore, the opportunity for great achievement. Can we give the young men and women also the comradeship which is, next to the opportunity for achievement, the most important factor in sweetening the outdoor life of hardship to which we are calling them? They must go in groups and colonies. We need a revival and readaptation of the old New England method of settlement by colonies. Sometimes a preacher would gather a congregation around himself and lead them out into the wilderness and build up a little colony around his church. We no longer have a wilderness where free land can be had, but, with less hardship a colony could be started on land which would have to be purchased. It would be necessary for the colony as a whole to work out the problem of credit and farm finance. An organized rural life, whether it be of the old New England type, or of some other type, will be necessary to give the sense of comradeship in this great rural crusade.

But what has this crusade to offer to the young men and women of America? From the standpoint of the pigtrough philosophy of life it has nothing to offer. They who prefer the fleshpots of Egypt would better stay in Egypt. Indoor work, freedom from responsibility, short hours, time for carousal in rooms full of lurid oratory, beer, and tobacco, will never be the lot of those who enlist for this productive campaign. But from the standpoint of the workbench philosophy of life, it has the best things in the world to offer.

To young men it offers days of toil and nights of study. It offers frugal fare and plain clothes. It offers lean bodies, hard muscles, horny hands, or furrowed brows. It offers wholesome recreation to the extent necessary to maintain the highest efficiency. It offers the burden of bringing up large families and training them in the productive life. It offers the obligation of using all wealth as tools and not as a means of self-gratification. It does not offer the insult of a life of ease, of aesthetic enjoyment, of graceful consumption, of emotional ecstasy. It offers instead the joy of productive achievement and of noble comradeship in the productive life.

To young women also it offers toil, study, frugal fare, and plain clothes, such as befit those who are honored with a great and difficult task. It offers also the pains, the burdens, and responsibilities of motherhood. It offers also the obligation of perpetuating in succeeding generations the principles of the productive life made manifest in themselves. It does not offer the insult of a life of pride and vanity. It offers the joy of achievement, of self-expression, not alone in dead marble and canvas, but also in the plastic lives of children to be shaped and moulded into those ideal forms of mind and heart which their dreams have pictured. To them also it opens up the joy of productive achievement and the noble comradeship of the productive life.

This does not mean that there are no possibilities of material reward

in the new type of agriculture to which young men and women are called. During the last two generations, owing to the rapid opening of Western lands, agriculture has been so depressed, that many farmers have felt discouraged. They seemed to be pouring their lives into a soil which drank it up and gave little in return. Thus the strenuous life of the farmer was robbed, in part at least, of the joy of achievement. He could not always see that he was achieving anything. That condition is now at an end.

Henceforth, the growing power of consumption, and the retarded expansion of our farm area will give the farmers who know how to adjust themselves to the new situation, a more ample reward for their labor. Nevertheless, every farm will continue to cry, like the daughters of the horseleech, "Give, give." The more productive it is the greater will be the opportunity for further investment of labor and capital in its improvement. The farmer will find little encouragement for a life of ease and luxury. They who desire that kind of a life will continue to go to town. They will be bought out by those who retain their strenuousity and their faith in the productive life.

To such as these the world belongs.

PROFESSOR HOLTON:

I think it was William Holly Smith who said, "Put the grease where the squeak is!" It seems to me that Dr. Carver has told us how to do that, at least in this big business of farming.

We are very fortunate indeed in having with us another man who has a national reputation. Most of us had heard about him before we had ever seen him at this meeting, and I am very glad indeed to present to the Congress, Dr. E. Dana Durand, who is at present Professor of Economics in the University of Minnesota, and as all of you know, was for a number of years Director of the United States Census.

At present he is engaged in a very important piece of work in a commission on reorganization of affairs of the State of Minnesota.

This evening, he is going to talk to us on "The Relation of Population to Food Supply."

Address of Doctor Durand.

THE RELATION OF POPULATION TO FOOD SUPPLY

There is a reason for the Dry-Farming Congress—a reason that concerns all the people of this country and of the entire world. That reason is the need of more food. Until some superchemist of the indefinite future shall learn to make synthetically food from the rocks and the air we shall be, as we are today, absolutely dependent on the cultivation of the soil.

It is a maxim centuries old that growth of population tends to outrun the growth of food production. Malthus and other thinkers have seen little hope for maintaining the balance between the two except through the checking of population by starvation, disease and war. It is not my purpose to discuss the Malthusian theory. There is at least enough truth in

it to warn men that they must be vigilant to make the most of the forces of nature in the production of food.

No world statistics are available either of population growth or of the growth of agricultural output. Little reliance can, I fear, be placed on some recent calculations of statisticians going to show that the output of food crops, taking the world as a whole, is increasing faster than the number of inhabitants. The crop statistics of many countries, including our own, are too uncertain, or at least were too uncertain during the earlier years with which more recent years are compared, to warrant any conclusions as to changes in world totals. One thing is certain. The population of Europe, North and South America, and Australia—taken as a whole—is increasing at the rate of at least 10 or 12 per cent per decade. If that rate should be maintained throughout the Twentieth century it would mean much more than doubling the population of those continents. The world must work hard and work scientifically if it is to keep its food supply abreast of such a vast increase of mouths to feed.

Until recently this country itself left little pressure of population on the means of subsistence. We had a rich new territory, thinly populated. The fact that agricultural production grew each decade less rapidly than population gave no occasion for immediate alarm. It meant merely the advantageous diversification of our industries; the desirable growth of manufactures and of commerce. We were still great exporters of food. But today the situation is very different. We can see ahead of us a possible shortage. If present tendencies continue long we shall have to import largely, not merely tropical and exotic foods but also those very foods which have been the main products of our farms and ranges.

Between 1900 and 1910 the population of the United States increased 21 percent. The number of farms increased only 11 percent; the rural population increased 11 percent; the urban three times as fast—34 percent. The acreage planted to crops, including non-food crops as well as food crops, increased 10 percent. This figure is probably the most reliable index to the extension of the area of production.

We should have less anxiety over this relatively slow extension of crop area if farms were producing materially larger yields per acre than before. As a matter of fact the last census found absolutely no increase in the average production per acre between 1899 and 1909. By averaging the percentages of increase in the quantities of the various crops, giving to each a weight proportional to its importance, it is found that the total quantity produced was just 10 percent greater in the later year than in the earlier. The rate of increase in production was precisely the same as that in acreage. That is, the yield per acre was stationary. Of course there are good years and bad years in agriculture, but it is the opinion of experts that, taking the country over and all crops together, a comparison between 1899 and 1909 is a fair comparison.

Population thus increased during the first decade of the Twentieth century twice as fast as crop production. Such a disparity cannot continue

long without disaster. The more detailed statistics were equally discouraging. The production of the cereals, taken together, increased only 2 percent. The figures as to the number of livestock for the two censuses are not precisely comparable, but they make it substantially certain that during the decade there was a decrease of several percent in the number of cattle and sheep and probably also a decrease in the number of hogs. Even the dairy industry and the poultry industry, for all the attention given to them in recent years, failed to keep pace with the population.

More rosy views of the progress of agriculture are sometimes drawn from the crop estimates of the United States Department of Agriculture. It should not be forgotten, however, that these do not pretend to be anything but guesses. The department admits without hesitation that the census figures are the more reliable, and uses them as a basis for revising its estimates from time to time. At least until recently the estimates of the department were, unfortunately, far from accurate, and lent themselves to very misleading conclusions as to the increase of crop acreage.

Of course the census statistics are now five years old. Conditions may have improved somewhat in that time. There can be no doubt that the acreage of wheat increased rapidly in 1913 and 1914 and exceptionally favorable weather conditions made the crop of 1914 far larger than any previously harvested. As to the more permanent tendencies of yields per acre one can scarcely draw safe conclusions from the figures of a few years.

There are plenty of other evidences, aside from statistics of crops and domestic animals, that agricultural production in this country has been in general falling behind in the race with population. Two familiar results prove it—the great advance in the prices of farm products and the decline in food exports.

In the last two or three years more abundant yields have resulted in some decline of prices, but the general level is far higher than it was fifteen or twenty years ago. Between 1899 and 1909, according to the returns of the farmers themselves to the Bureau of the Census the average farm value of crops per unit increased by two-thirds, 66 percent. According to calculations of the Department of Agriculture the average prices received by farmers for their products went up six times as fast during that same decade as the average prices of the leading products bought by farmers. Of course the prices of commodities in general have gone up during the last twenty years, largely because of the increased production of gold. But the farm products have outstripped other products materially, a fact which can be attributed only to a relative shortage of output from the farms. It was largely because of the tremendous advance in the prices of farm products that the average value of farm land per acre in the United States more than doubled during the first decade of this century. The farm-owner in general has prospered; failure of agricultural production to keep pace with population has no terrors for him. But

the constant advance in food prices casts a heavy burden upon other great classes, especially upon the wage-earner.

The statistics of exports and imports bear eloquent witness to the failure of American agriculture to grow with the rapidity of population. The exceptionally good crops of wheat in the past two or three years have revived our export of that cereal temporarily, but even so we have sent abroad a far smaller proportion of our output than we did 15 or 20 years ago. In 1900 exports of wheat, including flour reduced to a wheat basis, represented one-third of the crop of the United States; from 1910 to 1914 little over an eighth. In 1900 we exported more than 300 million pounds of fresh beef. In the last year or two, since the removal of the duty, we have been importing tens of millions of pounds from Argentina.

It is a fact not generally known that in 1912 the value of our imports of foodstuffs for the first time in our history exceeded the value of our exports of foodstuffs. The balance has again swung the other way, but not very far and perhaps not for long. Of course most of the food we import at present is of a kind that we cannot produce, or to which our soil and climate are less adapted than those of other countries—products like sugar, coffee, tea, cocoa and tropical fruits. At the same time there is a startling difference between the present time and 20 or 30 years ago, when the value of our food exports was more than twice as great as that of the imports.

There are obviously two ways by which to maintain a balance between growth of population and growth of food supply; check the growth of population or increase that of food production. Of the one means of checking the growth of population in our own country, the only one which has been seriously advocated, is restriction of immigration. Immediate action in this direction is rendered unnecessary by the mighty war which is tearing the heart of Europe and that will greatly check migration to the United States for some years to come. Heretofore, however, immigration has been one of the big factors in swelling the number of mouths our farms must feed. Had there been no immigration, population would have increased 14 instead of 21 percent between 1900 and 1910. If the immigrants went to the farms they would presumably raise at least enough to feed themselves. But practically all of them go into nonfarming industries.

To increase the production of food more land must be used or more must be got out of the land. Either of these may be accomplished in two ways—by more labor or by more science.

Nature has set ultimately an absolute limit to the amount of land that can be cultivated. Taken the world over, however, there is still much unused but usable land. Only about one-fourth of the area of the United States is under the plow. Much of what remains is incapable of cultivation, it is too rocky or too arid. Some of it is better adapted to grazing and to forestry than to tillage. Even in the well-watered sections of the country, however, there is a good deal of land that could and should be brought under the plow—swamp land, cutover timber land, imperfectly utilized pas-

ture and wood lands, etc. In the arid and semiarid sections, as more fully pointed out later, there are large areas capable of cultivation.

To the productivity of soil per acre there is almost no limit if sufficient labor and sufficient intelligence be applied. It is possible for this country to support many times its present population. It is possible to obtain far larger yields of each particular crop. Moreover, the capacity of the land to support population can be materially increased by readjustment of the proportions of the several crops planted, increasing the acreage of crops with high food yield. It is a familiar fact that western Europe produces far more food per acre than our own country. The yields of the common cereals in countries such as Germany, France, Belgium, England, and Denmark are approximately double those in America.

Doubtless more labor must be devoted to agriculture in this country if population continues to expand in the future as it has in the past; it may ultimately be necessary that a larger proportion of the population than at present devote itself to the production of food. The present tendency of population to increase far more rapidly in cities than in rural districts can scarcely continue indefinitely. More labor could be got on the farms if the streams of immigration could be diverted from the factories to the fields and if the heavy movement of the native population from country to city could be checked. Some have even suggested that compulsory measures be taken to send the immigrants to the farms and keep them there at least for a period of years.

If we have the right, as most people believe, to exclude immigrants altogether, have we not equally the right to impose conditions upon their entrance? The administration of such a law would be difficult but not impossible. Such a measure need not be advocated for the immediate future but it deserves careful consideration as an ultimate aid in the solution of the food problem.

A good deal can doubtless be done by information bureaus and other means of making known the opportunities and advantages of the country districts.

Apart from any such more or less artificial measures there is reason to believe that the shortage of agricultural labor will to some extent work its own cure. The higher prices of farm products resulting from that shortage of labor mean higher profits of farming, greater inducement for the boys to remain on the farm and the possibility of paying higher wages to farm laborers.

However, the outlook would be discouraging indeed if the only hope for increasing agricultural production lay in using more labor on the farms. Unless constant improvement is made in agricultural methods, each new laborer will produce less than the one before. This is the familiar law of decreasing returns. Perhaps the farmers of western Europe know how to farm better than most American farmers, but the chief explanation of their high yields per acre is the large amount of labor expended. After all, the test of success in farming is quite as much production per

man as production per acre. The less labor the world can use on the land and still supply its needs, the better. Whatever labor can be released from the fundamentally necessary task of food production can be devoted to increasing the diversity and raising the quality of the other goods which the people enjoy. If the time shall ever come when over-crowding makes it necessary for the great bulk of the American people to toil for the mere means of filling the stomach, our standard of living will descend to the level of that of China or India.

The main hope for future agricultural and national prosperity is in using more brains rather than more labor on the land. It is all very well to make two blades of grass grow where one grew before, but let us not, if we can help, use three men, or even two men, to do it where one worked before. It is all very well to make the desert bloom as the rose, but let us do it by brain rather than by brawn if possible.

The outlook for scientific progress in agriculture is bright. Thousands of experts all over the land, and in every other land as well, are studying this most fundamental of all industries. I am not myself an agricultural expert, and I will not even try to list the many ways discovered in recent years for using more land and for increasing the productivity per acre. The fact that thus far little if any increase in crop yields has been shown in the United States should not unduly discourage us. So long as good land was abundant and cheap the farmer hardly needed to bother his head with new-fangled notions of efficiency. Now that the pressure is beginning to be felt, he will surely come gradually to think harder about his work, to be more resourceful, more ready to avail himself of the discoveries of others. Surely the tremendous activity of the agricultural colleges, of the federal and state departments of agriculture, of the multitude of associations and agencies for the investigation of agricultural methods and the dissemination of information will count for much. The wonderful progress of America in methods of manufacture, mining and transportation shows what she can accomplish when she seriously sets herself to agriculture.

It will be necessary that we use more and more those lands where moisture is somewhat deficient. Abundance of rainfall is only a relative term. There are areas in this country, large areas unfortunately, where Nature has definitely banished agriculture, but there are other large areas which she bids us reclaim by scientific cultivation. She has set us an enigma, by spreading before us fertile soil while furnishing only meagre quantities of that without which soil is useless, moisture.

I know of no satisfactory statistics showing how much land in the United States, now uncultivated, is capable of raising crops through dry-farming or through irrigation. The figure doubtless would run into hundreds of millions of acres. Take this state in which the Dry-Farming Congress is assembled. In the two western tiers of counties alone there were in 1910 more than 6 million acres not yet under the plow. Only one-fourth of their total area was cultivated. Yet the land in these counties

is scarcely less fertile than in eastern Kansas where nine-tenths of the area is cultivated. The great bulk of this uncultivated land can probably be used profitably by dry-farming. That the people are coming to realize this is shown by the rapid increase in the amount of improved land in that section. The land under cultivation in these two tiers of counties increased two and one-half times between 1900 and 1910; it has increased much since 1910.

The same conditions appear in large parts in Nebraska and the Dakotas; in scores of counties at present only from one-twentieth to one-fourth of the land is under cultivation. In the four western tiers of counties in Nebraska the land under the plow in 1910, although still relatively small, was three times as great as in 1900. Millions of acres in these border states of the semiarid region have been added to the cropland of the world during the past decade.

The great area of plains lying between the states we have been considering and the Rocky Mountains is perhaps, a little drier than western Kansas or Nebraska, but otherwise it is very similar. In this section relatively much less land is under cultivation than even in the border counties of the adjoining states to the east. Not millions, but tens of millions of acres of fertile land east of the Rockies await the skill of the dry-farm expert and the irrigator.

Still further west the conditions are more varied. Some of the great region between the Rocky Mountains and the coast is too mountainous and rocky ever to be cultivated; some, though fertile, has not enough rainfall for dry-farming, and is not even capable of irrigation. But on the whole there is a great deal of land in this section which can be cultivated either by dry-farming or irrigation. Of course there are considerable areas near the Pacific coast where moisture is abundant.

One can scarcely expect dry-farming methods to produce as much both per acre and per man as farming where moisture is abundant. It is the task of science to reduce the disparity to a minimum, particularly the disparity in production per man. We can afford to use our semiarid land somewhat lavishly; any use is better than none at all. But we cannot afford, on our drier lands any more than on those in more humid regions, to see a decline in the quantity of product turned out by each worker. Everlasting study and improvement of methods must accompany the extension of dry farming.

One of the great problems before the American people is the effective utilization of the mighty West. When we remember that in the Mountain and Pacific divisions, which together comprise two-fifths of the United States, less than one-sixth of the area is occupied by farms and less than one-twentieth under cultivation, we realize the magnitude of the problem. When the population of the eastern half of the country approximates in density that of western Europe, as some day it doubtless will, the teeming millions will stretch their hands to the west for relief from the severe pressure of food supply. Evidently we must take time by the forelock.

We must study with greatest care every possible way of remedying the deficiency of rainfall; we must not shrink from great and expensive undertakings in the way of irrigation. In the long run the man who devises means of producing food where none was produced before, or of increasing the yield of the land, will be looked upon as a greater benefactor than any other discoverer or inventor.

PROFESSOR HOLTON:

The Secretary, Mr. Faxon, has a communication from Dr. Frank L. McVey, president of the University of North Dakota, who was to have taken part in this discussion tonight. Doctor McVey was chairman of the recent Second Conference on Marketing and Rural Credits in Chicago.

The Secretary will read the communication.

SECRETARY FAXON:

Doctor McVey writes:

"In response to the request of the Secretary of the Dry-Farming Congress I have undertaken to set down briefly some points along the line that I was expected to talk upon when invited to take part in this program.

"It was with the greatest regret that I was compelled to substitute a paper presentation for a personal appearance. The exigencies of administration at this time, however, particularly in connection with some questions arising over the income of the university, have kept me at my post and prevented my attendance upon the meetings of the Congress.

"I trust, however, that I shall have the opportunity of appearing before you at another time."

The address of Doctor McVey follows:

AGRICULTURE A BUSINESS

Agriculture has just come into the position of a recognized business. At the time the Country Life Commission was created President Roosevelt put forth a formula for solving the rural problem. It was "better farming, better business, better living."

Better farming includes all three and means the application of modern science to the practice of agriculture. Better business has reference to the application of modern commercial methods to the transactions of farming. First, as to the conduct of the farm, the keeping of accounts and reducing it to a cost system; second, to the sale of commodities; and third, the organization of sale methods. It thus appears that farming must be better organized as to production, distribution and finance.

Sir Horace Plunkett, the Irish cooperator, states that the farmers must take notice and heed the economic law roughly stated, that things must be done in a large way if they are to be done profitably. The work of the Farm Management Division of the Department of Agriculture has given the farmer pretty definite information about the cost of producing various crops. It has also made numerous suggestions concerning

the placing of buildings, the planning of fields, and the rotation of crops. This information will be helpful to the individual farmer, but much remains to be done in cooperative lines.

Cooperation in Agriculture

The work of the cooperators in Europe has attracted widespread attention. Through combination they have been able to standardize their products, lower the cost of production and finance their operations. The Danes have carried cooperation into most of their agricultural operations while retaining individual ownership and control of lands. The extent to which this movement has gone in this remarkable country is well shown in the fact that the 200,000 farmers have 4,000 societies and these societies have 20,000 board members. In 1911 the export of butter from Denmark was 229,300,000 pounds; in the same year the bacon export was 252,200,000 pounds.

Financing the Farmer

Not long ago the writer had a letter from a woman homesteader in southwestern North Dakota. She pointed out how the settler was left with little or nothing after he had proved up. If he borrows \$400 or \$500 on a quarter section to pay the government, there was left a possible \$250 to purchase stock and tools. The Canadian government and the Canadian railways have recognized this situation by extending credit to the settler to the amount of \$3,000 to erect his buildings and an additional \$1,000 to buy stock. The loans are protected by legal devices that are fair for both parties to the transaction.

In the United States the financial development, so far as banks are concerned, has been in the direction of meeting commercial demands. The loans on mortgages have been for short terms and on commercial paper in the main for periods of ninety days or less. These conditions do not meet the needs of the farmer, whose time of production is longer and his earnings smaller than in manufacturing enterprises. While it is true that the large farmer has little difficulty in securing the money he wants for agricultural purposes, the small farmer, like the woman homesteader, finds it difficult to secure the necessary financial assistance. Moreover, the farmer goes in debt for seed and machinery, so that his enterprise is burdened from the start.

Agricultural Credit.

Because the financial institutions have not been constructed to serve the special needs of the farmer, storekeepers, implement dealers and purchasers of farm products have been forced to furnish financial aid. This situation has been met in Europe by the creation of cooperative credit and land banks. The fact that the outstanding feature of agriculture is the length of the period of production requires a different credit organization than that developed by merchants and manufacturers for themselves.

By uniting groups into a so-called bank, utilizing their joint credit on the basis of unlimited liability of shareholders, agricultural credit societies were created that have increasingly met the needs in Europe. So,

too, by borrowing on the lands owned by a group and placing a mortgage on all of them, jointly, funds are raised to be loaned out again to individuals.

While the financial history of America varies greatly from that of Europe, still it is possible to adapt the principles developed abroad to our own banking system. This has been proposed by the United States Commission appointed to investigate agricultural credit abroad.

The substitution of the credit of the **group** from that of the **individual** is the key to the problem.

It is to be hoped that real results will come from the bills offered in the 1914 session of Congress. These proposals are based upon the utilization of existing banks or the creation of cooperative banks authorized to loan money for long terms on lands offered by borrowers for security. The terms of the loan require an adequate value as a basis and annual payments both of interest and principal. The length of the term, approximately 35 years, lessens the burden on the borrower in any given year and does not act as a detriment against his efforts, as so often proves to be the case in short term loans. While the cooperative credit and land banks have been highly successful abroad, yet their existence has without question increased indebtedness, and in this country would undoubtedly augment the speculation in land, which is now one of the banes of farming, making it, instead of an industry, a kind of real estate enterprise.

Financial and Market Organization

It will be recognized that every business has its financial and market organization, and the same must be true of agriculture.

Three phases of the market relation may be put down and these suggest problems that must be solved in their order. The first is the standardizing of product; the second the establishing of uniform conveyors; and the third the direct entry of the producer into the market. Lack of time prevents any adequate discussion of these points. They are given as suggestive only. Some progress has been made in standardizing and a little in the matter of uniform conveyors, but no great progress will be made until the matter is taken up as part of a large problem in a big way. This can be brought about through cooperative agencies better than in any other way.

It is said that seeing is believing. When evidences of possible methods of standardizing and actual conveyors are presented, together with some facts concerning the specific organization of marketing, agriculture can go on more rapidly than it has in the past.

The purchase side has been greatly emphasized by the agricultural colleges and the government departments, but we have now reached a point where we must emphasize to just as great a degree the selling side of agriculture. This will require, as already intimated, a careful study and analysis of the problem, and the placing of exhibits before the farmers in order that they may see what can be done.

In this brief paper I have attempted to show something of what rural credit can do and how far the market problem affects agriculture.

Note: The following communications from friends of the Congress, unable to be present, were read earlier in the day's session, and are grouped here for convenience:

From Past President Mondell
HOUSE OF REPRESENTATIVES U. S.

Washington, D. C., October 10, 1914.

R. H. Faxon, Executive Secretary-Treasurer
International Dry-Farming Congress,
Wichita, Kansas.

My Dear Mr. Faxon:

I shall appreciate it if you will express to the officers and members of the Dry-Farming Congress my very sincere regret at my inability to be present at your meeting.

The passing of time but serves to emphasize in my mind the importance of the movement which the Congress was organized to encourage and which it has so successfully promoted.

I know of no organization and movement having to do with agricultural interests which has so wide and important a field.

The principles of dry-farming are as essential to the restoration of millions of acres of land in the East and South as they are successful cultivation of vast areas in the West.

I wish you all an enthusiastic and helpful meeting and remain,

Very truly yours,
F. W. MONDELL.

From Speaker Clark
THE SPEAKER'S ROOMS
HOUSE OF REPRESENTATIVES

Washington, D. C., October 10, 1914.

Mr. Ralph H. Faxon,
Executive Secretary-Treasurer,
Ninth Annual Congress and Exposition,
Wichita, Kansas.

My Dear Mr. Secretary:

It is regretted that my duties here will preclude the possibility of my attending the sessions of the International Dry-Farming Congress, October 12-15, that being my busiest week in the House. I should like very much to take advantage of your kind invitation and enjoy the opportunity of seeing the Congress and Exposition.

Very truly yours,
CHAMP CLARK.

From M. A. Carleton

Washington, D. C., October 13, 1914.

R. H. Faxon, Secretary,
Dry-Farming Congress,
Wichita, Kansas.

Appreciate contents of your message, but other matters prevent my going and preparation of paper.

M. A. CARLETON, Cerealist,
United States Department of Agriculture.

From Minister Motherwell

Regina, Saskatchewan, September 14, 1914.

W. M. Jardine,
Wichita, Kansas.

My Dear Mr. Jardine:

I am in receipt of your favor of the 10th instant, and was pleased to know you have everything in such good shape for the coming Congress at Wichita. You can rest assured that if there was any possible chance at all of my attending the Congress, I would be there.

My work has been very heavy this summer, and so long as I can get around, I stay with it. The Legislative session opens here tomorrow, and as this is a special session to deal with unusual circumstances arising out of conditions occasioned by the present European war, I can scarcely venture to say just how long it will last, but it is scarcely possible the session will be over in time for me to be with you on the 12th proximo. Even if it were, my sciatica leaves me unfit to travel as it causes me a good deal of difficulty to get around even here.

It may be interesting for you to know that in parts of this province this year, much of the crop was a total failure because of drought—where farmers were not familiar with dry-farming methods. In the very worst districts I found that in the same section, one farmer would fail so completely as to have nothing worth putting the binder into; while his adjacent neighbor would have 25 bushels to the acre.

At the College of Agriculture farm at Saskatoon, Dean Rutherford was just telling me today that they had 25 bushels of No. 1 wheat weighing 65 pounds to the bushel on their summer-fallow, and from the time the seed was sown until it was in the stack, they had only 1.67 inches precipitation. This is all the more remarkable when you know they had only one rainfall that amounted to one-half inch, another one to .34 inches, and all the rest scanty showers that possibly would not count more than one-hundredth of an inch at one time.

I think this is a wonderful tribute to what can be done by storing moisture in the soil the previous year by early and improved methods of tillage.

In my own district I am sure that we did not have more than two inches of rainfall from seeding to harvest; and only one rainfall reached a depth of five inches in the ground; another one about three inches; while

the rest were scanty little showers not amounting to anything except to cool off the air.

I grow winter rye, and it went about 32 bushels to the acre. My brome went about 300 pounds, and my oats 40 bushels to the acre. Of course this is a light crop for here, but I think it is wonderful considering the very dry and exceedingly hot summer we have just passed through.

I do not grow any wheat myself, but some of my neighbors had as high as 30 bushels to the acre, and some 35 to 37; and I consider this a great testimonial to dry-farming methods which all the older settlers practice on the open plains of Saskatchewan.

Mr. Jardine, I would just love to be with you to recite these facts, and many others I could mention.

With best regards to yourself, and thanking you for the strong representations you have made on behalf of my presence, and in conclusion wishing you a most successful Congress, I remain

Yours very truly,

W. R. MOTHERWELL,

Minister of Agriculture.

WEDNESDAY, OCTOBER 14

MORNING SESSION

Crops and Silos

The Congress was called to order by President Waters.

PRESIDENT WATERS

Is the Secretary present? If there are no announcements, I desire to read a communication from Doctor Widtsoe, who, as you will see by the program, was to preside at the morning session, but who has been detained at home. This is addressed to Mr. Drummond.

From Past President Widtsoe

AGRICULTURAL COLLEGE OF UTAH

Logan, Utah, October 9, 1914.

Mr. W. I. -Drummond,

Chairman, International Board of Governors,

International Dry-Farming Congress,

Wichita, Kansas.

Dear Mr. Drummond:

As I telegraphed you today, protracted sickness in my family compels me to remain home. I think it is the first Congress that I have missed since its organization. Dr. Robert Stewart, the bearer of this letter, is a delegate representing Utah Agricultural College and if it meets with your approval I should much like to see him take my place in such official work as is needed to be done by the Board of Governors.

With best wishes to you for a most profitable session of the Congress,
I am

Sincerely yours,

JOHN A. WIDTSOE,
President.

In the absence of Doctor WidtsOE, it is my pleasure to introduce to you, as the presiding officer of the morning, Professor Alfred Atkinson, of the Montana Agricultural College.

CHAIRMAN ATKINSON:

I believe that those who have attended the sessions of the Congress in the past will agree with me when I say that the program yesterday was about the best the Congress has ever offered us, not only in the quality of the addresses given, but the theme. The program this morning promises to be unusual and deals with some of the things that are identified with permanent agriculture. The first address, "The Domestic Orchard for the Dry-Farmer," is a subject worthy of consideration, which is to be discussed by Albert Dickens, Horticulturist in the Kansas Agricultural College, at Manhattan, Kansas. I have the pleasure of introducing Professor Dickens.

Address of Mr. Dickens

THE DOMESTIC ORCHARD FOR THE DRY-FARMER

I never get a glad hand before I begin to talk but what I am reminded of the story of the Southern congregation which was going to raise their pastor's salary \$10.00 a year, but I am glad that your chairman this morning indicated that this question of horticulture is not a joke in the dry-land agricultural proposition. It has been considered a joke a good many times. I am inclined to think, in the last 10 or 15 years, the greatest joke the government ever perpetrated is the Timber Claim Act. But there is a need of horticulture in this shortgrass country, on these dry-land farms.

Horticulture is the part of agriculture that makes agriculture a fizzle when you don't put it in. I have had this called to my mind several times when our boys come in from the western part of our state and they are anxious to study horticulture. I asked how many varieties of apples they knew, and some knew 25 or 30, all the good old favorites. Reno county students knew 10 or 15. One lad who grew up in the extreme western part of the state said the only two varieties they ever shipped into his town were Ben Davis and windfall!

In the making of civilization, you cannot get a home without trees because your women will not stay and you do not want any civilization where your women will not stay. Any civilization that is not founded on the permanency of the home is not worth much—it will not last long. The men who came to Nebraska or Kansas and stayed a few years and got a few crops of wheat did not help the civilization of the West. It is only the man who goes there who thinks he sees the chance to make a permanent home, who really helps the civilization of a country.

I am not going to advocate any Royal Road in trying to use force in

this effort to conquer the desert. The old phrase has rung in my ears for a long time. We do not think of any desert indications in Rice county any more. They made a charge on the desert along back in '86 and '87 and they were repulsed because they went with more enthusiasm than with knowledge of agriculture. They could not stay, but men who did stay, who did find a place where they could make a home and work, have succeeded. They made homes there because they could grow trees. Around any good home there should be some trees, even though we cannot grow anything more than a switch tree. If you find a place in a draw where there is a nice little piece of ground that is well protected and watered, there is a mighty good place to try for an orchard. Fix up some way so all that water will not run off.

In the history of Kansas horticulture, I think there is one word that stands first and foremost, and that is subsoil. You can grow some trees for a long while on any soil in Kansas, but when it comes to planting trees that you know will grow, the word you want to watch all the time is subsoil. There are thousands of acres in Kansas where we do not need any exploration, except to find we are on that good, deep, rich subsoil that lasts always. The last two or three years have shown us some lessons. The men who are buying irrigation plants are men who have a stratum of hard soil that does not let the water through, therefore the irrigation systems. The man who plants trees without some investigation of the subsoil is taking a chance. If you can only plant a dozen trees, do so; but see that those trees have the benefit resulting from the water, and see that the water will be held when it comes, and you will be doing more good than the man who plants thousands of trees and plants them carelessly. The real estate men of Kansas have got down now and learned that the best thing to tell about any country is the truth. The man who looks a problem in the face and finds out all the facts has a better chance for success than the man who just guesses. Until we find some way to get that water down into that subsoil, it is going to be a mighty slow way for the trees to grow.

If I could only say one thing to the young fellows who are going into the dry-land country, it would be to remember that the red cedar is the oldest member of the tribe in the shortgrass country. It is one of the last of the race. It is here because it could accustom itself to conditions and could fight with the water and wind. The prairie fire was hard on the cedar, as this is its worst enemy. It is worth more than any other species of native trees because it offers more resistance to wind than any other tree. I know that a good many of these old settlers did their part to deforest the canons of Kansas, but they do not need to make any apologies because they needed those red cedar posts.

A species like that, we must understand, will grow 24 inches a year for the first five years, and we have done that well out at the Hays Station. We got in too big a hurry 25 or 30 years ago—we wanted a tree that would grow quickly, so we planted the cottonwoods. The red cedar does not need so much water. It is a natural born economist. It takes just as little food

as any plant can and live, and it evaporates just as little moisture as any plant can, and live. That furnishes a hint to most any man who is planting trees in this Great Plains region—to plant trees that need the least moisture. Plums, cherries, etc., are good ones to plant. I have never yet found any species of currants that could fight its way through so well as the black currant.

The results these plants give are the results we ought to work on in figuring in this home-making horticulture that is the kind of horticulture I think we need in this dry-land region.

This talk is not meant for the man who lives in the creek botom where he can grow anything. It is meant for the dry-land man—the man who, when he plants trees, is going to utilize the space between the trees for some garden. The garden should be made ready the fall before. Preparation is what counts. A man cannot say, "I cannot fall plow here." He will have to cover the ground and mulch it, etc., then rake it off in the spring, put a windbreak around it, etc. He has no time to wait for anyone to make the ground ready. He has to make it right himself. The stuff is there but it takes a mixture of time and brains to make that soil grow varieties. The varieties that are succeeding all over Kansas and western Oklahoma, if you get them in the right place, like the red cedar, reduce their evaporation to the minimum. They do not blossom too early in the spring and they do not have their leaves out too late in the fall. For instance, the principal trees a man should try to raise are Winesap and Maiden Blush apples, Early Richmond cherries, black currants for jelly, and some of the plums that have been so successfully raised. If he has these, he has a proposition that is going to furnish him pie material, and what every farm home needs more than anything else, perhaps, is pie! Of course, I am not intimating that the Kansas homes are short on pie, even though they do not have the trees, but you cannot make homes out of the canning factory.

A permanent home proposition is what we need. When the family leaves the farm and moves to town to educate the children, leaving the land in charge of a renter, the land goes down and down, and so this permanent home proposition is what we must have if we make it anything like a success.

For you men who come from the Dakotas and from Colorado, there is no reason why, if we start the pine early, it is not perhaps a better tree in general landscape effect and general appearance, and at the Hays Station, it is equal to the cedar in every point except one. That is hail, which has cut more hopes in two and pounded them down into the ground than any other factor we have. The red cedar, if cut down, with only one little leaf left, will come out the next season. The pine is next in this respect. It took the other trees a year to get over the hail. One of the things we are trying to do in our state is to propagate the red cedar. It is a long, slow process. Some of this seed will start the first year, some the second and a little more the third.

The windbreak and the pond or the irrigation pump are essential,

perhaps, for the strawberry bed. Cornstalks have made a good windbreak around the garden plot.

The red cedar minds its own business and stays at home a good deal better than a cottonwood. The red cedar will not interfere with the asparagus planted close to it, and it goes on down into the ground instead of sending out its roots 40, or 50, or 60 feet around in every direction.

This matter of permanence is the thing to remember in this thing of the dry-land farming. The next point is, you will agree, a good many trees if you will plant the seed where the tree is to grow. Thus you have done away with the necessity for transplanting. In some locations, we find it is not uncommon for a walnut tree eight inches high to have 24 inches under the soil. We have not modeled our civilization like Paris, and our civilization has adapted itself to conditions. The little red cedar does well if it is longer than my finger when it is one year old. You may not get a tree every time you try. You might have hailstorms to contend with, or a dry time or something else, but that is the kind of a civilization this country needs—somebody to do those things, and to plant those trees that make for the permanent home. It costs more to grow an oak from an acorn than from a cutting, because it takes more hours of work, and it costs you more to grow that tree, but that is what we need in these orchards—that your own work and your own time and your own thought have been spent there. In the years to come if you meet a man who says, "I planted that row of cedars in '14 or '15," and then, when you go further along, "Father planted those and Mother tended those," then you have a civilization that means something to the country.

When you get your heartstrings twined around a tree, you have a civilization that means something to the nation.

CHAIRMAN ATKINSON:

I believe Deputy Minister Mantle described some agricultural conditions which exist in Canada, and I believe he relieved us of delusions some of us had.

We now have an address by Professor John Bracken, of the University of Saskatchewan, Canada. He is Professor of Field Husbandry there, and will take up something along that line.

Address of Professor Bracken

SOME OBSERVATIONS FROM SASKATCHEWAN'S DRIEST YEAR.

Crops cannot grow without moisture. The rainfall in southwestern and central-western Saskatchewan is, on the average, relatively light. In 1914 it was less in most parts than in any year since grain-growing commenced. At Saskatoon the precipitation for May, June and July was 4.38 inches. The average for the province for 10 years is 8.29 for these three months.

Many crops "failed," either partially or completely—a few even on fallowed land. Some failed on land broken last year. But most failures were found on "old" land—land in second, third or fourth crop after fallow

or breaking. In the few cases where crops were sown on 1914 spring breaking, the general result was what we always expect in a dry year—a complete failure.

In the year 1911 fall frosts came early and damaged the cereal crop materially. In that year a dozen or more practices that tend to produce early maturity were brought forcibly to our attention. Has the “year of drought” left with us any such compensation? The brief observations that follow are offered in the hope that they may be of service to the men who, on farms in dry areas, are endeavoring to do their part to lessen in the future the serious effects of this untoward climatic condition.

In the investigation field on the University farm, a piece of land was fallowed in each of 17 different ways in 1913 and the yield of wheat ranged from 16 bushels to 34 bushels, 20 pounds; the yield of oats from 28 bushels, 8 pounds to 58 bushels, 8 pounds; and the yield of barley from 10 bushels to 34 bushels, 23 pounds, according to the tillage given.

In the same field stubble land that had borne two crops after being broken was tilled in the fall of 1913 and spring of 1914 in each of 33 different ways for the third crop. The actual yield of wheat on this land ranged from 5 bushels to 23 bushels, 10 pounds; while the yield of oats ranged from 15 bushels to 45 bushels, 10 pounds per acre, according to the tillage method followed.

The causes of the low yields in these cases were the same as those that contributed to the low yields in the drier parts of the province. They all trace back to the supply of available moisture in the soil.

An analysis of the experiments indicated above forces us to the conclusion that certain specific tillage practices are desirable in those regions where the supply of moisture limits the yield of crops. Among these may be mentioned

The Necessity of Fallowing.

The average yield of wheat on well-fallowed land was 30¼ bushels per acre, as compared with 16 bushels, 53 pounds on well cultivated stubble and an absolute failure on spring breaking.

Surface Cultivation Before Plowing the Fallow.

A fallow plowed shallow early in the spring and harrowed before the regular plowing, increased the yield of wheat 2 bushels, 2 pounds; the yield of oats, 1 bushel, 22 pounds; and the yield of barley, 2 bushels per acre; while double-discing early in the spring increased the yield of wheat 22 pounds; that of oats, 3 bushels, 10 pounds; and that of barley, 1 bushel 44 pounds over land otherwise similarly prepared.

Early Plowing of the Fallow.

A fallow plowed June 1 produced an increase of 10 bushels, 24 pounds of wheat; 12 bushels, 6 pounds of oats; and 11 bushels, 16 pounds of barley more than a fallow plowed July 1—while a fallow plowed June 15 produced 10 bushels, 20 pounds of wheat; 7 bushels, 10 pounds of oats; and 8 bushels and 28 pounds of barley more than a fallow plowed July 1, but otherwise similarly treated.

Growing a Pasture Crop on the Fallow Decreased the Yield.

Growing a thin crop of oats on the fallow for pasture decreased the yield of wheat 11 bushels, 20 pounds, and the yield of oats 19 bushels, 29 pounds; while rape sown in rows for pasture on the fallow decreased the yield of wheat 8 bushels and the yield of oats 6 bushels, 6 pounds per acre.

Once Plowing of the Fallow Preferable to Twice Plowing.

On land free from grass, once plowing in the middle of June with later surface cultivation with disc and harrows increased the yield of wheat 2 bushels, 3 pounds; oats, 3 bushels, 11 pounds; and barley, 4 bushels, 34 pounds over land plowed in the middle of June and harrowed and plowed again in August and packed and harrowed. Deep plowing of the fallow is also desirable in dry regions, but on new land a depth of seven or eight inches should generally be reached gradually and not at the time of the first fallow.

"Grassy" Stubble Should be Plowed.

Stubble land containing some creeping-rooted grasses yielded, when plowed, disced, packed and harrowed in the fall, an increase of 3 bushels, 15 pounds of wheat and 13 bushels 6 pounds of oats more than adjoining unplowed stubble that was disced, packed and harrowed in the fall and grassy stubble plowed, disced, packed and harrowed in the spring, returned 5 bushels, 56 pounds more wheat and 10 bushels, 3½ pounds more oats than unplowed land that was disced, packed and harrowed in the spring.

Plow Stubble Land in Early Fall in Preference to Later.

Fall plowing done early after harvest increased the yield of wheat 2 bushels, 10 pounds and the yield of oats 7 bushels, 49 pounds over fall plowing done three weeks later, but otherwise similarly treated.

Harrow Plowing Immediately.

It should be mentioned here that all fall or spring plowing, particularly the former, should be well worked down immediately after the operation. If it is not done soon, the moisture evaporates quickly, and if it is not done at all, the yields are often less than if left unplowed. The average increase in the yield of wheat over a period of four years from harrowing immediately after the operation, was on shallow plowing 1 bushel, 44 pounds, and on deep plowing, 2 bushels, 13 pounds.

Packing.

The average increase during four years from packing deep plowing was 1 bushel, 43 pounds of wheat; from packing shallow plowing, 45 pounds of wheat, while packing unplowed land decreased the yield slightly in three of the four years, but increased it in the fourth, a year when the frost came early in the fall.

Soil Conditions Important.

Our observations based on four years work incline us to the opinion that the "condition" of the soil and the presence of grass are the principal factors that determine the best depth and the best time to plow stubble land. Spring plowing, fall plowing, shallow plowing and deep plowing

have each in turn, but in different seasons, given us the largest yield. In each case the plowing that proved best was done at the time that the soil was in the best condition for plowing, and at the depth that enabled the best work to be done.

Surface Cultivation Helps Stubble Land.

The average yield of all stubble land that was surface cultivated was 2 bushels, 35 pounds of wheat; and 7 bushels, 22 pounds of oats more than the average for those not cultivated in any way. In the absence of weeds and in the presence of a long heavy stubble, we do not expect such an increase. In such a case, for immediate returns, burning in the spring followed by surface cultivation, is preferable in spite of the fact that burning dissipates organic matter and nitrogen.

Early Surface Cultivation Preferable to Late.

Early surface cultivation in the fall increased the yield of wheat 1½ bushels, and the yield of oats 1 bushel, 24 pounds over similar surface cultivation done late in the fall.

Frequent Cultivation Pays.

Potatoes, cultivated four times produced 19 bushels more marketable tubers and 10 bushels less unmarketable ones than the same variety cultivated twice.

Harrow the Growing Crop.

No figures are available to prove the value of harrowing the growing crop this year, but careful observations confirm us in the opinion that the harrowing of all cereal crops, corn and potatoes after they were up, materially increased the yield. Fields that are very loose or rough, or covered with small heaps of uncovered stubble, respond less favorably to this treatment, but on weedy land, and particularly in dry years, its advantages are very apparent.

Sow Thinly in Dry Areas.

One bushel of wheat, one bushel of oats, ¾ bushel spring rye, ½ bushel winter rye and 20 pounds of flax, each produce larger net yields than thicker seedings.

Alfalfa when seeded at 4½ pounds per acre in rows 24 inches apart and cultivated, yielded more forage than all heavier seedings in closer rows, but otherwise treated in the same way.

Alfalfa sown at the rate of 3 pounds per acre in rows 36 inches apart yielded more seed than any thicker seeding in closer rows.

All our thinly sown hay crops gave larger returns than those sown more thickly.

I trust these observations may be of some value and interest.

SECRETARY FAXON:

Mr. Chairman: The committee to confer with Chairman Drummond relative to certain changes in the constitution is asked to meet in the lobby at once. That committee consists of E. P. Humbert, New Mexico; J. H.

Worst, North Dakota; A. F. Mantle, Canada; Hector M. E. Pasmezoglu, Greece; W. M. Jardine, Kansas.

I want also to call the attention of the international representatives, most of whom I think are in the hall at this time, to the fact that it is the desire to take a picture of them and of President Waters sometime between now and 12 o'clock.

I have here, Mr. President, a telegram from Professor Mark A. Carleton, which you might read at your convenience.

CHAIRMAN ATKINSON:

Professor Carleton was to have been on the program this morning, but sends a message stating he cannot get away from Washington.

This audience will need no introduction to the next speaker, L. E. Call, Agronomist at the Kansas Agricultural College.

Address of Mr. Call.

CROPPING SYSTEMS FOR WESTERN KANSAS

In the more humid and older districts of the eastern United States definite systems of cropping are followed on nearly every farm.

Crops have been grown in this section of the country for more than a century and it has been definitely proved that under most conditions it is unprofitable to grow the same crop continuously even on the richest of ground. The different crops adapted to the region have been studied until accurate information is available regarding the effect of each upon the soil. The particular crop which follows another to the best advantage is also known. With this knowledge it has been a simple matter to plan for almost any combination of crops, cropping systems that will utilize to the fullest extent the moisture and available plant food in the soil, that will maintain the soil in the highest state of productiveness, and at the same time insure the greatest ultimate profit from each crop grown.

It has been impossible in the short time western Kansas has been farmed, to work out with any degree of certainty the best cropping system for that section of the state. New crops better adapted to western Kansas conditions are frequently introduced and each new crop requires a little different manner of soil preparation and handling. It will probably be impossible to plan systems of soil management and crop rotation as definitely as the farmers of eastern United States have planned their rotations. It will, at least, be impossible to do so until we have greater knowledge than we have today of the soil, crops and climate of the region. It is, however, important that a study be made of the cropping systems that promise to be most profitable.

Such a study has been started. During the past ten years the Kansas Experiment Station in cooperation with the United States Department of Agriculture has made a study of the cropping system best adapted to western Kansas. This work has been done at the Branch Experiment Stations at Hays, Garden City, Dodge City, Tribune, and Colby and upon the farms of farmers with whom we are cooperating. On these farms there

are under way at the present time over two hundred different rotations and systems of soil management. While this work is of too short duration to have definitely determined the best system of soil management for this region, a few important facts have been fairly definitely established. These are:

1. That the greatest success cannot be obtained by growing the same crop on the land continuously.
2. That a thorough preparation of the soil for crops is as essential in western Kansas as in the more humid regions.
3. That grain crops cannot be depended upon to produce profitable returns each season even though the best methods of soil management be used.
4. That forage crops of the sorghum family are the most dependable, and for the most profitable utilization of these crops, livestock must be kept upon the farm.
5. That a sequence of crops should be so arranged that the greatest possible use is made of all moisture stored in the soil.
6. That moisture can be stored in the soil by summer fallow, and that occasionally summer fallow is necessary in all well-planned system of cropping.

Value of Summer Fallowing.

The value of summer-fallowing as a successful means of conserving moisture has been amply demonstrated. It has been proved beyond a question that moisture can be stored in the soil and held from one season to another by properly summer-fallowing the land. The amount of moisture that can be stored in this way will depend upon the amount of rain that falls during the fallow period, the character of the showers, and the way in which the fallow is handled. It usually requires one-half inch or more of rain in order that water may enter the soil to a sufficient depth to be stored. Light scattering showers simply wet the surface of the ground and the moisture evaporates before it penetrates the soil to a sufficient depth to be held by cultivation.

In western Kansas from 20 to 30 percent of the annual rainfall can usually be stored in the soil by summer fallowing. The big problem in fallowing land is not preventing evaporation, but getting the moisture into the ground. Moisture will not readily pass through finely pulverized soil. Therefore, a soil that has been fallowed and continuously worked with a smoothing harrow absorbs water very slowly. In cultivating the fallow ground, it should be worked as little as possible with implements like the smoothing harrow and disk that pulverize the surface soil, but should be cultivated with implements like the spring-tooth harrow and corn cultivator that leave the ground ridged, that do not pulverize the small clods, but leave the small lumps of soil on the surface of the ground. This not only permits rain to be absorbed more readily, but tends to lessen soil blowing where blowing is a danger.

The value of summer-fallowing for storing moisture in the soil has

been well shown at the Hays Branch Experiment Station where for the past five years four different plats of ground have been cropped to wheat. Two of these plats have been cropped continuously to wheat and the other two plats alternately cropped to wheat and summer-fallowed. One of the continuously cropped plats was plowed each year as soon as the wheat was removed and the seed bed prepared in the best possible manner. By this method, the plowing was done as early in the summer as was possible and still produce a crop of wheat each year. The other plat continuously cropped was plowed about two weeks before seeding and as good a seed bed as possible prepared for the wheat.

Moisture samples were taken to a depth of six feet on each plat at time of seeding and an accurate record was kept of the grain and straw produced. The results are shown in the accompanying table:

Note: See next page.

It will be seen from this table that at time of seeding the summer fallowed ground has each season contained much more moisture than the ground continuously cropped. As an average of five years, the summer fallowed ground contained 4.5 percent more moisture in the surface six feet of soil than the early plowed continuously cropped ground, and 5.9 percent more moisture than the continuously cropped late plowed ground.

The value of the larger quantity of water in the summer-fallowed land is shown by the larger yields of wheat secured from this plat. As an average of five years, alternate cropping and summer fallowing has produced an average annual yield of 21.2 bushels of wheat per acre. This is an increase of 7.4 bushels per acre over continuous cropping where the ground was plowed early in the summer and an increase of 12.4 bushels per acre over late fall plowing.

In alternate cropping and summer-fallowing, but one crop is secured in two years, thus, twice as much ground is required for the same acreage of wheat as is required when the ground is continuously cropped. Therefore, in order to make the results comparable the yield of wheat on the fallowed ground should be divided by two. If this is done the average yield of wheat on the summer fallowed ground is 10.6 bushels per acre, which is 3.2 bushels less than early fall plowing, but 1.8 bushels more than late fall plowing.

It is, therefore, evident that although but one crop is produced in two years, the practice of summer-fallowing is more profitable than late fall plowing, and where such a large acreage of wheat is grown that the ground cannot all be properly prepared for the crop early in the season, it will prove profitable to summer fallow a portion of the wheat land.

In summer-fallowing, it is necessary to sow, harvest and thresh but one crop in two years, so that the cost of producing a crop of wheat on summer fallowed ground will not be twice the cost of producing wheat by the best method of continuous cropping. In fact, when the fallow is properly handled, the cost of producing a crop by summer-fallowing will not greatly exceed the cost of producing a crop by the best method of continuous cropping providing the interest on the investment in land is not considered.

Summer Fallowing vs. Continuous Cropping

Hays, Kansas, 1910-1914

Average Per Cent of Moisture in Soil at Seeding Time

Method of Preparation	Percent of moisture in 6 feet of soil at seeding time					
	1910	1911	1912	1913	1914	Avg.
Late Fall Plowed.....	18.3	14.1	13.3	14.6	17.1	15.4
Early Fall Plowed	19.6	16.2	15.1	15.15	17.8	16.8
Summer Fallowed	23.12	21.6	17.9	22.2	21.8	21.3

Yield of Grain and Straw Per Acre

Method of Preparation	1910		1911		1912		1913		1914		Average	
	Grain Bu.	Straw Lbs.	Grain Bu.	Straw Lbs.	Grain Bu.	Straw Lbs.	Grain Bu.	Straw Lbs.	Grain Bu.	Straw Lbs.	Grain Bu.	Straw Lbs.
Late Fall Plowed	20.3	2985	0	0	2.3	265	.8	815	20.6	3475	8.8	1508
Early Fall Plowed	27.8	3135	0.3	80	13.8	3425	2.3	1273	24.8	3600	13.8	2302
Summer Fallowed	42.5	4845	2.6	795	29.2	5240	10.3	3245	21.6	4397	21.2	3704

From the results of these tests it is doubtful if it would prove profitable alternately to crop and summer fallow land if it were possible to prepare the ground each season by either plowing or listing early in the summer. Where a large acreage of ground is to be prepared for wheat with limited equipment, it is impossible to prepare all the ground at an early date. Under such conditions, a system of summer-fallowing that will distribute the work through the different seasons of the year and thus allow all work to be done more opportunely will undoubtedly prove profitable.

A System of Summer Fallowing in Continuous Wheatgrowing.

On farms where wheat is practically the only crop grown and where sufficient equipment is not available to handle all of the ground in the best possible manner, a system could be profitably practiced whereby one-fourth or more of the land is fallowed each season and three-fourths planted to wheat. The ground to be fallowed could be double-disced early in the spring and plowed as soon as spring rains fall and when the ground was in good condition for plowing. It is usually cool at this season of the year; equipment is available and deep plowing could be done. There would be sufficient time between plowing and seeding for the deep plowing to become thoroughly packed. Where wheat is grown continuously in western Kansas, it is not safe to plow deep for there is not sufficient time, even though the plowing is done early, for the ground to become packed by seeding time. It is, therefore, necessary, if deep plowing is to be done, to introduce into the system of farming an occasional summer fallow. The object should be to have all the summer fallowed ground plowed before the opening of harvest.

After plowing, the ground should be worked just enough to keep down weed growth. In fact, over-working should be avoided to prevent the ground becoming so smooth and fine that water would be slowly absorbed and that blowing might follow. The ground that had been summer fallowed the preceding summer could be prepared by listing or discing as soon as possible after harvest. On a loose type of soil where plowing had been deep in preparation for the summer fallow and the ground was loose at harvest time, the best method of preparing the seed bed would be by discing or, if there was little or no weed growth, by stubbling in the crop.

The ground that had been fallowed two years before should be plowed or listed to only a medium depth soon after harvest and prepared for the crop in the best possible manner. The ground to be summer fallowed the next season could be disked the fall or summer before if labor was available for the purpose. If not, it could be left unworked until the following spring.

By such a system a farmer handling four hundred acres of wheat each year would divide his farm into four one hundred acre fields as shown by the accompanying table:

A System of Continuous Wheatgrowing With Fallow.

Field	1915	1916	1917	1918	1919
A 100 acres.....	Fallow	*Wheat	†Wheat	‡Wheat	Fallow
B 100 acres.....	*Wheat	†Wheat	‡Wheat	Fallow	*Wheat
C 100 acres.....	†Wheat	‡Wheat	Fallow	*Wheat	†Wheat
D 100 acres.....	‡Wheat	Fallow	*Wheat	†Wheat	‡Wheat

*Wheat on fallow.

†Wheat on disced ground.

‡Wheat on early plowed ground.

Of these 400 acres, 100 acres would be fallowed each summer and 300 acres would be seeded to wheat. One-third of the wheat grown would be sown on fallow, one-third sown on early listed or plowed ground and the other one-third sown on plowed or disced ground, or stubbled in, depending upon the character of the soil and season. Such a system of summer-fallowing would divide the work and distribute it throughout the year and at the same time would not reduce, but would undoubtedly increase the productiveness of the land over a system of continuous cropping.

The Summer-Fallow in Rotation of Crops.

The most profitable way of using the summer-fallow is in a rotation of crops. It is a demonstrated fact that the most successful farmers in central and western Kansas are those who are following a diversified system of farming and growing feed crops for stock together with wheat. The sweet sorghums, kafir, feterita, and milo are the most profitable feed crops. To produce the maximum yield of wheat and kafir or sorghum under such conditions, the crops must be grown in rotation and not grown on the same land continuously.

Wheat will not, under normal conditions, make a profitable crop when sown on sorghum or kafir stubble. Kafir or sorghum grow late in the fall and exhaust the soil so completely of moisture and available plant food that wheat sown upon such ground is usually a failure. Therefore, in planning a rotation of crops for such conditions, summer fallowing is indispensable.

The accompanying table shows a three-year rotation on three fields where wheat and kafir are grown and the ground summer-fallowed one year in three.

A Three-Year Rotation With Fallow.

Field	1915	1916	1917	1918
A	Fallow	Wheat	Kafir	Fallow
B	Wheat	Kafir	Fallow	Wheat
C	Kafir	Fallow	Wheat	Kafir

Where wheat is the most important crop and where there is sufficient moisture to justify it, a 4-year rotation of wheat—two years, sorghum or kafir—one year, summer fallow—one year, can be followed. When kafir or sorghum is the most important crop, a 4-year rotation of two years of kafir or sorghum, one year of summer fallow, and one year of wheat can be used. In either case, the ground is summer-fallowed after kafir or

sorghum and in that way the soil is stored with moisture and available plant food and will produce the maximum wheat crop the following year.

CHAIRMAN ATKINSON:

Not all of the workers in the dry-land regions fully realize what agrostology means. The head of the office of the United State Department of Agriculture is here this morning—C. V. Piper—and he is to discuss the question of "Forage Crops."

I am glad to introduce to you Mr. Piper.

Address of C. V. Piper.

FORAGE CROPS AND THE EXTENSION OF DRY-FARMING AGRICULTURE

The great problem confronting American students of dry-land agriculture, when reduced to a single concrete statement, may thus be formulated: How much of the dry lands of the West can be brought into permanent and profitable cultivation?

At the present time the more optimistic among us profess to believe that practically every tillable acre will yet be made to yield profitable crops, while the more pessimistic are sure that much land has been plowed up that had better been left as natural pasture.

Is it possible at the present time to forecast on a basis of actual knowledge which one of these prophets speaks the more truly so that we can give advice with some assurance to the prospective settler? Or must any future progress repeat the history of the past—a recurrent advance of settlers in seasons of favorable conditions, and a retreat when the unfavorable seasons intervene?

Optimism is more often a good thing than is pessimism, but it may seriously be questioned if any man has the right to preach optimism as regards unproved possibilities of dry-farming, the more so that the actual burden of probable failure has to be borne by people poorly equipped either in experience or means.

Reduced to its simplest terms, the extension of dry-land agriculture depends primarily upon two factors: 1. The improvement of tillable methods; 2. The securing of better dry-land crop plants.

At the present time I shall not discuss the matter of tillage. Extensive experiments are under way throughout the West, and we may confidently expect to know within a few years just which tillage methods give the best results under given conditions.

What, then, are the prospects, so far as the better drought-resistant crops are concerned—and I use the term "drought-resistant" here in its popular meaning; namely, the ability to produce crops under conditions of low rainfall?

I shall limit my discussion largely to the dry land east of the Rocky Mountains. You are aware of the fact that everywhere in this area the normal annual rainfall is at least 14 inches. To bring even the driest part of this area into successful cultivation seems but a comparatively small

step beyond what has already been accomplished in dry-land agriculture—but it is a step that profoundly affects many million acres of tillable soil.

In the discussion of drought-resistant crops, permit me to consider them in two categories, first, nonforage crops; second, forage crops. The nonforage, dry-land crops are the small grains—namely, wheat, barley, oats, rye, and cotton. Some of the sorghums, like broomcorn and the grain sorghums, may be considered nonforage, but these may be discussed with the other sorghums. Since the dry lands have been cultivated the most noteworthy, new, drought-resistant, nonforage crop introduced is durum wheat, first brought in in the Nineties. The introduction of the durum wheats added materially to the area from which profitable crops could be grown.

How much further dry-land agriculture may be extended by finding or developing more drought-resistant varieties of the small grains, and in the South, of cotton, no man can predict. It is clear, however, that there are still possibilities in this direction. It is not clear, however, that there are any other food plants likely to be discovered that are more drought-resistant for the area in question than the small grains. The sorghums and the millets are here omitted to be discussed elsewhere.

It is a remarkable fact that all of the important crops grown for human food were cultivated by primitive man. While possibilities may exist in improving other wild plants so as to produce food for man, the fact remains that since there has been written history no such new food plant has ever yet been developed. It would therefore appear that the profitable extension in dry-land agriculture of crops for human food will, apart from improved tillage methods, have to depend upon the breeding or discovery of better drought-resistant varieties of the small grains we already have.

So far as cotton is concerned, the case does not appear to be materially different.

When we come to the forage crops, however, the case is considerably more complex and the possibilities much greater.

For the purposes of this discussion, I shall consider the dry lands proper are those where broadcasted alfalfa is not a profitable crop. Where broadcasted alfalfa succeeds, there is, generally speaking, no serious forage problem. East of the Rocky Mountains broadcasted alfalfa will succeed at the Canadian boundary where there is but 18 inches annual rainfall, and in central Texas where there is but 25 inches. This is, however, locally modified by the topography of the land and the character of the soil.

Our real dry-land area east of the Rocky Mountains, therefore, is that which lies between the limits of 14 and 18 inches of rainfall in the northern part of the Great Plains area, and between 14 and 25 inches in Texas. In the area in question, the successful forage crops are in the main annuals; namely, the small grains for hay—wheat, oats, barley, rye—the sorghums, the millets, field peas, and cowpeas. It must frankly be admitted that none of these, nor all of them combined, have solved or are likely to solve the problem of profitable forage production on all of the area in question. The

use of the small grains for hay is limited practically to the area where these crops produce grain successfully. Incidentally, their use for this purpose is very much more extensive west of the Rocky Mountains than it is east of the Rocky Mountains, and largely for the reason that the former region has a winter rainfall and the latter a summer rainfall.

Millets—The millets represent a group of plants which were primarily developed for human food. In this country, however, they have been used exclusively for forage. There are cultivated three distinct botanical species, represented by the foxtail millets, the broomcorn millets, and the barnyard millets. There are several other millets in addition to these, none of which has as yet been found to be of any particular value in America. As regards millets as a whole, it is a very striking fact that their utilization as forage has for twenty years been gradually diminishing. In the humid areas this is just as conspicuous as in the dry-land areas, where they are more and more being replaced by the sorghums. There is no reason to believe that their relative importance will ever become materially greater.

Sorghums—The most striking advance in the line of agriculture with dry-land crops during the past ten years has been with the sorghums. Ten years ago I was impressed with the fact that for the southern portion of the Great Plains Area the sorghums were practically certain to form the basis of any permanent agriculture, and over a much wider area they were important. In accordance with this belief we of the United States Department of Agriculture for the past ten years have been scouring all parts of the world for sorghums, and in that time have secured many hundred different lots from all parts of Africa where they are native, and from Asia where they have long been grown.

By far the great majority of these new importations have proved inferior to those that we had, and their characteristics are of interest only to the botanist and the agronomist. Among them, however, have been a few which have materially helped to solve the problem of dry-land forage.

Among these two are worthy here of particular mention; namely, *feterita*, first secured in 1907 and first distributed in 1910; and Sudan grass, first obtained in 1909 and first distributed in 1912. Doubt is still expressed among agronomists as to whether *feterita* is any more drought-resistant than milo and kafir. There seems to be no such doubt among farmers, as in northern Texas *feterita*, now, four years after its introduction, is planted in at least as great an acreage as milo. The data of 1913, which was a peculiarly dry year, leave no doubt in my mind that the plant does possess superior drought-resistance to any of the other grain-producing sorghums.

Sudan grass, a still more recent introduction, has created a very great interest. It is still too early to state whether Sudan grass possesses greater drought-resistance than other sorghums, as comparisons are difficult, because Sudan stools whenever favorable conditions occur and thus may produce 2 to 5 cuttings.

Inasmuch as Sudan grass is so entirely different in appearance and use from the other sorghums, and inasmuch as it is a plant which previous

to 1910 was entirely unknown both to botanists and to agronomists, some details regarding the events which led up to its discovery may be of interest. In 1885 Hackel, a noted German botanist, published a very extensive paper on the classification of the sorghums. His knowledge of these plants was based almost entirely upon dried and preserved material. In other words, he knew very little of the plants as growing. One of the conclusions reached by Hackel was that all of the cultivated sorghums had been derived by cultivation from Johnson grass. This theory for various reasons did not appeal to me, but did excite my curiosity. I reasoned that if Johnson grass were the wild original of the sorghums we ought occasionally to find specimens of Johnson grass which lacked the underground rootstocks which make it so feared in the South as a weed. And on the other hand I argued that if this were the origin of the sorghums we should occasionally find sorghum plants which produce rootstocks. Three years of study failed to disclose any Johnson grass without rootstocks or a sorghum which did possess rootstocks.

Feeling, however, that there must exist a plant somewhat similar to Johnson grass, and yet devoid of rootstocks, I wrote letters to botanical correspondents in nearly all parts of the world, asking for packets of seed of Johnson grass. When we grew these seeds, we found some very different plants. The important point, though, is that two of them—one secured from Tunis, and the other from Sudan—proved to be plants of the type which I had postulated must exist; namely, plants similar to Johnson grass, but without rootstocks. The grass from Sudan proved to be very desirable in our preliminary trials as a hay plant, and therefore quantities of seed were grown and the plant distributed under the name Sudan grass.

Further investigation into these grasslike sorghums has revealed a very much more complicated condition of affairs than I had believed. In searching for the wild original of cultivated plants, botanists and agronomists have usually looked for some one wild plant which was the original of all the cultivated ones. Naturally when I obtained Sudan grass I was inclined to think that this might be the wild original of all the sorghums. Further investigation, however, indicates that the problem is very much less simple. I was fortunately able to borrow from London and Berlin all of their botanical material of the sorghums from Africa, and a study of this material shows that in the continent of Africa, where alone the true wild sorghums grow, there are at least ten or twelve wild forms. Most of these are grasslike plants in a general way similar to Sudan grass, but one or two of the wild ones seem to partake more of the nature of the cultivated sorghums in having only one or a few stout stems and relatively larger heads and seeds. Of the grasslike forms we have now succeeded in securing four of the wild races and hope within a year or two to secure the others. What their value may be in comparison with Sudan grass it is impossible to predict, but it is quite possible that some of them may be found superior to Sudan grass.

In this connection it is a matter of interest to inquire how it happened that a grass which has promise of such high value as Sudan grass should have so long escaped attention. You can readily understand that the negro tribes of Africa in cultivating sorghum, which was their corn crop, would be primarily interested in those which produced large seeds. We must assume that the plants they cultivated all produced seeds having food value in the wild stage, and in fact at least one of the wild forms known in Africa was thus gathered by the negroes. In the further cultivation of these plants they would, of course, be primarily interested in the greater production of grain, and thus it has come about that we have the numerous varieties of sorghum having only one or a few stout stems and large heads with comparatively large seeds. On the other hand, the negro would not be interested in a hay plant as such, as no primitive tribe ever cultivated forage as such. Consequently these grasslike sorghums would be completely neglected so far as cultivation by the negro is concerned.

Incidentally some possibilities in regard to Sudan grass not before realized in the sorghums now seem to be assured. Among our Sudan hybrids we have some which are relative dwarfs—that is, which grow only 3 or 4 feet high, while the ordinary plants grow 6 to 7 feet high—and which possess considerably larger seeds. We are here, I feel confident, on the threshold of developing a variety of grain sorghum which will be a small grain crop—one that can be harvested readily with the same type of machinery which we use for our wheat and oats. I am sure that we shall have a number of varieties of these small grain sorghums having slender straw, not much coarser than wheat, and with various types of grain as heavy as the straw will be able to support.

Inasmuch as Sudan grass has already given, under exceptionally favorable circumstances, yields as high as 60 bushels of seed, we can, I think, look forward to developing these small grain sorghums so that they will yield very heavy crops of grain. This, of course, is merely an incidental outcome which may or may not help solve the problem of profitable crops on lands not now cultivated. It serves to illustrate, however, the possibilities that still exist in ancient crops when they are studied intensively.

The mention of these dwarf Sudan grass hybrids leads me to discuss one other point usually associated with dwarfness which has become of great importance; namely, earliness. It is obvious with the small rainfall in the Great Plains Region that any additional earliness, or rather shortness of life period, that can be secured in the sorghums will tend to make their yield more certain, as a crop can be planted later if necessary when the moisture conditions are more favorable. Sudan grass is earlier than any other variety of sorghum yet known, and if we can retain this earliness or get increased earliness in the form of a small grain crop, it will permit the extension of the area over which sorghum crops can be grown. I predict with considerable confidence that we shall obtain this desired end from the hybrids of these early grass-sorghums.

Canada field peas can probably be grown successfully anywhere in the dry-land region where wheat is a success. In the Northern states they must be sown in early spring, but from central Texas southward they can be grown successfully by sowing in the fall. Canada peas have not been as much used in dry-land agriculture as I think they will be when the importance of livestock in dry-land agriculture is more generally recognized. They furnish first of all, a legume crop for rotations; second, they furnish a valuable feed crop which, however, in the main will have to be pastured by animals in order to be profitable.

In the southern part of the Great Plains Area there are a number of other legumes which succeed well under dry-land conditions. The most important of these is the cowpea, but its increased culture will likewise depend largely upon its being utilized by livestock.

You will note that the forage plants which I have mentioned in connection with dry-land agriculture are all annuals. It must be admitted that all of the crops I have mentioned, even if we allow a reasonable degree of improvement by the methods of breeding, and also improved methods of culture, are not in themselves likely to result in the profitable cultivation of all of the dry lands east of the Rocky Mountains.

There is a deep-seated belief in the human mind that somewhere there grows a plant of value to man adapted to every condition. The history of the past gives some basis for this faith. If such a plant exists it is, of course, most likely to be some grass or legume—some forage plant, in short. As I pointed out before, all of the human food plants are of very ancient culture, and the likelihood of finding a new crop of this sort is very small.

Among the 10,000 existing species of legumes and the 4,000 existing species of grasses, however, there are still unexplored possibilities. In the hope that we can find grasses and legumes adapted to all the arid conditions of western America, the department has been very active for many years in introducing grasses and legumes from all parts of the world. With few exceptions, however, these have not proved to be of value, or at least, not as good as things which we have already. There yet remains, however, a vast amount of work to be done in this direction, and it is quite possible that we shall yet find the plants we desire.

It is a striking fact that all the forage crops grown in America which are planted broadcast are of Old World origin. Many years ago the department did a great amount of work in the endeavor to domesticate many of the wild grasses in the West in the hopes that under cultivation these would give valuable crops. Today there is only one native American grass that is at all cultivated, and that only in a limited area; namely, slender wheat grass. All of the others are of Old World origin. Why this is the case I shall not stop here to discuss, but it has led us in our endeavors to find better drought-resistant grasses and legumes to look mainly to the Old World, and particularly to Asia and Africa.

The culture of grasses and legumes for forage is admittedly a pro-

duction of European civilization. To some extent, it is true, alfalfa was grown in ancient Persia, but in the main, ancient European peoples have depended for forage for their flocks either upon wild plants or upon the waste of cultivated crops for human food. This is still essentially the case in China and India, and India has more cattle than the United States. It is even more true of the less-developed peoples who have never grown forage crops as such. Consequently the value in cultivation of the numerous grasses and legumes in Africa and Asia is but poorly known, and it will be many years yet before the possibilities in this direction are fully or even largely investigated.

These facts give abundant hope that the faith of the man who believes that plants will yet be found to make the culture of our arid lands profitable, may yet be realized.

In addition to the dry-land crops I have already mentioned, there are some other possibilities which results of recent investigations have revealed. I doubt very much whether a more drought-resistant perennial forage plant than alfalfa is likely to be discovered. A great deal of interest was excited over the yellow-flowered alfalfas introduced from Siberia, but the result of investigations thus far clearly indicates that this is not likely to be of any value except for breeding purposes. The hybrids of the yellow and purple-flowered alfalfas are very valuable, having both increased cold-resistance and apparently some increased drought-resistance. Any hope, however, that they would extend the culture of alfalfa much farther on the dry lands is practically destroyed.

The culture of alfalfa in rows has resulted in its successful utilization where the rainfall is far too little to grow alfalfa broadcasted. Thus far such culture of alfalfa has been primarily with a view of seed production, but its possibilities in the way of hay production are also evident whenever economic conditions will permit. Similar but limited experiments with various perennial grasses indicate that they may be successfully grown in the same manner, but as yet such growing, of course, is warranted only on a basis of producing seed crops.

In portions of the country the cultivation of the larger cacti, both spineless and spiny, has created much interest. The culture of these large cacti is limited practically to California, the southern half of Arizona, New Mexico, and Texas. Thus far their culture has nowhere been attempted on a large scale. The consensus of opinion seems to be that their culture is desirable mainly from the standpoint of having a reserve supply of food for an unfavorable season; in other words, a field of cactus is a sort of a living silo.

Another plant which has recently excited a lot of interest in connection with dry-farming is sweet clover for pasturage. The evidence at present seems to indicate that sweet clover is much more drought-resistant than alfalfa, and inasmuch as the plant has frequently proved itself of high value for pasturage, there are possibilities in its use under existing dry conditions which deserve much further investigation.

In late years the fact has become more and more impressed upon the

minds of students of dry-land agriculture that the successful utilization of much of our arid lands must depend largely upon livestock. As you are well aware, dry-land agriculture became developed sooner and to a greater degree west of the Rocky Mountains than it has yet east of the Rocky Mountains. This is largely associated with the fact that the region west of the Rocky Mountains is primarily one of winter rainfall, thus making it a simple matter to conserve moisture and also an easier matter to grow winter crops of small grains. It is also well known that under these conditions successful crops of wheat have been grown on as little as ten inches annual rainfall—less than occurs in any part of the area east of the Rocky Mountains. In the intermountain region, particularly in Washington and Oregon, there are many examples of where a farmer through the fortunate possession of a small piece of land that could be irrigated and thus be enabled to grow a limited amount of crops, has nevertheless been able to make a good living from the fact that the possession of this small piece of arable land gave him virtual possession of a larger or smaller amount of range land in the vicinity.

East of the Rocky Mountains the even nature of the country and the fact that practically all of the land is tillable has resulted in much of the land being plowed up, even in areas where with our present knowledge it is impossible for a man to make a living for his family from the crops that he can grow on 160 acres. If in addition to 160 acres of tilled land, the same farmer could have had 320 acres or more of land for pasturage, he probably would have been able to tide over bad seasons with the aid of his livestock. Indeed, many farmers have been enabled to succeed this way by buying up the abandoned farms of neighbors at low prices.

The lesson this teaches is, I think, obvious; namely, that much of the dry-land region can with our present knowledge be successfully farmed only where a considerable part of the land is left in range, by which the farmer can possess a sufficient number of animals to supplement years of scanty crops.

CHAIRMAN ATKINSON:

The following announcement has been sent up: The international delegates will hold an important meeting at 2 o'clock on the first floor of the Hotel Eaton.

The Secretary will now take up the matter of the two presentations on the program.

SECRETARY FAXON:

Is Deputy Minister Mantle here? Mr. Gore, Mr. McOmie, and Mrs. East, will you come forward, please, and Deputy Minister Mantle, please; and Chairman Drummond, if he is in the hall?

CHAIRMAN ATKINSON:

Just a moment: Mr. Bert Ball, of the Chicago Grain Exchange, is here, and as we wait, we will be glad to have a word from him. Mr. Ball

MR. BALL:

I want to say this: Suppose by some miracle I could take a photograph of everyone in this room and pass it around to you. What will each of you do as soon as the photograph is in your hands? I am not going to anticipate what Mr. Johnson will have to say about the county demonstrator, but I want to say there is a well-developed organization movement in regard to this county agent. I have no patience with the county agent thought. That thought has kept this idea back for at least 10 years. Neither do I like the word "farm demonstrator." It sounds as though, "If I had that money I could do better than that myself."

But we must be impressed with the idea of an organized taking of agricultural work direct to the farmer on the farm.

CHAIRMAN ATKINSON:

The Secretary will now take charge of the presentations as stated on the program.

SECRETARY FAXON:

Members of the Congress: In connection with the Congress, as you all know, by advice during the year and by personal observation since coming here, the International Soil-Products Exposition, following the custom of several years, has been held coincident with these sessions.

For the stimulation of zeal in exhibits, in displays, in demonstration of what has been done in various states and counties, a great exposition has been builded up here under the support of the International Dry-Farming Congress.

There has been very active support given, so much so that in the various states and provinces considerable competition has been aroused.

Fourteen states have entered the state competition, and as a reward for their industry, the Chicago Association of Commerce, following its custom of last year, offered a magnificent silver trophy cup to the state assembling the best state display. That trophy, as announced, was won by the state of Arizona, and Mr. E. E. Gore, of the Chicago Association of Commerce, is here this morning to present, with some little degree of formality, to the successful competitor, this beautiful trophy. I take much pleasure in introducing to you Mr. E. E. Gore of the Chicago Association of Commerce.

MR. GORE:

Mr. Chairman: The Association of Commerce of the city of Chicago believes it has a substantial and an important interest in the development and encouragement of agriculture, whether it is dry-farming or otherwise. The city of Chicago has been built upon the profits to be made through handling the products of agriculture. Had it not been for the great corn market which grew up at Chicago or the great livestock market, which still distinguishes that city above all other cities, Chicago itself would have been far from being the great metropolis which it is today. Its

debt to agriculture is greater than that of any other city; and it is in payment of that debt and in encouragement of the cause of agriculture that it was induced to offer the trophy to be competed for, which I am about to have the pleasure to present.

We believe, up in Chicago, that what is most needed in the United States today to insure its permanent prosperity, to preserve the even balance which ought to be preserved, is that everything possible should be done to encourage agriculture.

We believe that the greatest embarrassment which confronts America in the near future is the possibility of her not being able to feed her own people. The proportion of our population engaged in agriculture has been constantly falling while the proportion engaged in other industries has been rising and we are just at the point where a year or two or a partial crop would put us face to face with the problem of finding, from some other country, the foodstuffs to feed our people.

We are talking of the extension of our trade into foreign lands. We are talking, with a good deal of assumption, that the markets of South America await us. We are saying that the Chinese are longing for our goods, and there seems to be a disposition to take advantage of that particular condition and start up the wheels of industry and turn out the manufactured product, but all of the advantage that we can possibly have of that kind will be more than offset if we are going to have to buy what we eat, somewhere else. What the United States needs today more than any other thing is to have the productive capacity of the acres under the plow increased and to bring other acres under the plow. It is the big problem of the country and we are going to feel it more and more until these acres are brought under the plow.

It is a particularly pleasant thing that one of our states which we have a right to call the baby has been successful in this contest. I take it that there has been more or less interest in Arizona since it was first organized into a territory because there was never a moment when Arizona has permitted her identity to escape the rest of the people. I am not surprised that Arizona has won this competition, because Arizona has a way of making a noise all the time, and you really find she has something to make a noise about. There is an impression that Arizona is a land that is given over to cactus and sagebrush and stones, etc., and that her population is largely cowboys and others half wild, but it is a particularly pleasant thing that that state has shown all the rest something else than cactus.

Mr. McOmie, as the representative of Arizona, I congratulate you, sir, I congratulate you personally, on the part you have had in the arrangement of the exhibit—I congratulate you as a citizen of the state and I trust, sir, that the pleasure you may have in exhibiting this trophy may be one-half as great as the pleasure of the Chicago Association of Commerce is in presenting it.

SECRETARY FAXON:

It would be highly appropriate, of course, for Mr. A. M. McOmie, as

a representative of Arizona, to say a few words in acknowledgement of Mr. Gore's presentation remarks, and congratulations. Mr. McOmie.

MR. McOMIE:

Mr. Secretary, Members of the Congress and Mr. Gore: I can hardly find words to express my appreciation and the appreciation of the Governor of our state and the good people of our state of the honor we have in winning this handsome trophy.

There are a few things, however, which I believe should be pointed out to this audience—that should be made to stick in the minds of these people assembled here.

I want to call your attention to the natural beauty of Arizona. We have there a little ditch, a little gorge, about 2 miles wide, 5,280 feet deep, and 200 miles long that is visited annually by thousands and tens of thousands of tourists from every portion of this country, called the Grand Canon. There is nothing like it on this or any other continent, with its petrified forests, its huge trees four or five feet in diameter. We have there the Painted Desert which it is absolutely impossible for me to attempt even to describe. We have the oldest town in the United States—Tucson.

Talk about dry-farmers! The originators of dry-farming, the Indians, have been practicing dry-farming as long as they have lived there, which, so far as we know, has been forever. These Indians have been raising beans for ages and ages on land on which no white man has been courageous enough to try to raise anything. They have given us the Tepary bean. These same Indians have developed varieties of corn that no white man has ever originated. They are selfsupporting. They never starve to death.

One more thing: We have, friends, a climate that in the middle of the summer when the people of this beautiful city of Wichita are suffering with heat, these same people and you could, if you lived in Phoenix, get in a nice automobile and in three hours be where the temperature never goes higher than about 95 degrees. In the winter time, those people who suffer from cold come down and find the balmy sunshine of our land.

Now, friends, we believe you owe the baby state this courtesy of giving it this cup. We believe we have merited the winning of this cup. We did not come here, however, with any notion of getting the cup. We came for the good of the Dry-Farming Congress. We are a progressive state and we are a progressive people.

I thank you people of Wichita, and I thank this Congress most heartily, and I thank the Association presenting this cup, in behalf of my associates, and for the state of Arizona.

Note: In connection with the presentation of the trophy to the State of Arizona, the following messages from the Governor of Arizona were presented and read:

Messages From Governor Hunt.

Phoenix, Arizona, October 12, 1914.

Harry Welch,
Arizona Delegation,
Dry-Farming Congress,
Wichita, Kansas.

I sincerely regret my inability to be present at the Dry-Farming Congress, owing to duties in this state. It is highly gratifying, however, to know that Arizona is so excellently represented. Please extend the Congress my hearty wishes for a most successful and instructive convention.

GEORGE W. P. HUNT.

Phoenix, Arizona, October 12, 1914.

A. M. McOmie,
Wichita, Kansas.

My heartiest congratulations to Arizona representatives and co-workers on receiving first award for exhibits at Dry-Farming Congress and Exposition. Please extend to each Arizona representative my personal assurance of appreciation for the honor that has come to our state through his individual effort.

GEORGE W. P. HUNT.

SECRETARY FAXON:

The second premium in the state competition, \$50 in gold, is awarded to the state of Colorado, and I regret to say I do not have the money on my person at this time, but I want Mrs. E. T. East to say a few words in behalf of Colorado.

MRS. EAST:

Mr. Secretary and Members of the Dry-Farming Congress: It is usually considered a difficult thing for a woman to accept second place anywhere, and when that woman has youth and beauty and wealth and resources as the state of Colorado has, it should be especially difficult for her, but I want to say to you that the state of Colorado feels it is an honor to be next to her Little Sister, Arizona, and she is more than pleased that she has been accorded even by a small margin this honor, and so it is with joy and pride that Colorado, your Lady Friend to the West, takes second place!

To Kansas, who so gallantly stepped aside and allowed the visitors the free road on this occasion, and the city of Wichita, which welcomed us so royally and the International Dry-Farming Congress, whose work on a firm foundation, with a wider outlook than it has ever had before, and the officers of that Congress, whose executive ability and untiring devotion have made a success out of this annual fiesta, there comes a message of thanks and appreciation from the West; across the towering hills, Colorado reaches out her hands with a message, not alone of thanks and appreciation, but with the assurance that as she has shared your honor she wants to share your work in the world for the farmer and for the rural community.

On behalf of the state of Colorado, which you have so honored, and of the Denver Chamber of Commerce, which made that honor possible, I come to you with thanks and the assurance of a bigger interest and a heartier cooperation than we have ever felt in this work. As a sister, Colorado sends you greetings.

I thank you.

SECRETARY FAXON:

One other important competition was in behalf of the best bushel of wheat, which was open to the world. It was participated in by individuals, counties, states, and provinces and there is a mighty lot of it and a mighty fine lot of it; but for the best bushel of wheat, for which there was given the International Harvester Company's 6-horsepower portable oil engine, there competed a citizen of the province of Saskatchewan, Canada, and I am going to ask Deputy Minister Mantle to respond for that successful competitor.

MR. MANTLE:

Mr. Secretary: I am very pleased indeed on behalf of Mr. Seager Wheeler, who grew and exhibited the successful entry, and on behalf of our province, to acknowledge the honor Mr. Wheeler has brought on our country.

It may possibly interest you, and for the benefit of those who are here and who are themselves farmers working on their farms, I just wanted to mention the fact that Mr. Wheeler is a little Englishman in our country who came out 10 or 15 years ago and took up a homestead in the Rosthern district and has run a small farm there ever since. He is not a wealthy man—he is simply a man with an infinite capacity for taking pains. This is not his first winning. It is absolutely a question of hard work and the selection of grain. Last year, or 1913, Mr. Wheeler's crop was hailed out. Fortunately, not all his seed selection was ruined and in any case, being one who took pains, he had kept in reserve some of the seed. But Mr. Wheeler works under difficulties just as well as the rest of us, and I can assure you he will appreciate not only the engine itself, but he will be even more appreciative of the honor which he has won for himself, for our province and for our great Dominion.

I thank you.

SECRETARY FAXON:

In this wheat competition, the second premium was won by S. D. Carpenter, of Redrock, Oklahoma, and consisted of a 24-wheel subsurface packer, given by the Parlin & Orendorff Company, of Canton, Illinois.

CHAIRMAN ATKINSON:

This ends the session for this morning. The session this afternoon is under the general title of "Farmstead Irrigation," and will commence at 2 o'clock.

You are dismissed.

WEDNESDAY, OCTOBER 14

AFTERNOON SESSION

Farmstead Irrigation

The Congress was called to order by the Secretary.

SECRETARY FAXON:

This afternoon session is devoted to "Farmstead Irrigation," the aid to the small farmer or truckman, and it is peculiarly appropriate that the session should be in the hands of a man who is introducing Kansas to that sort of thing. The chairman of this afternoon's session will be H. B. Walker of the Kansas Agricultural College at Manhattan, State Irrigation and Drainage Engineer.

I now have the pleasure of introducing to you Mr. Walker.

Address by Mr. Walker

THE WINDMILL THE DRY-FARMER'S FRIEND

Dry-farming and irrigation must go hand in hand in redeeming the waste places of the earth.

Practically two-thirds of the earth's land surface receives a mean annual precipitation of 20 inches or less. Probably one-tenth of this enormous area can be reclaimed by large irrigation systems. The remainder, however, must of necessity depend primarily upon dry-farming for its development.

The problem of securing settlers for these dry-land districts is of great importance. The modern systems of soil culture for the conservation of moisture have done much to overcome the uncertainties of agriculture in these regions of scant and variable rainfall. Wheat, oats, barley, milo, kafir and similar staple drought-resistant crops are now produced with reasonable certainty.

Settlers are gradually pushing out into the more arid districts and are establishing farm homes. Today the more favorably located areas are well dotted over with farm buildings. These structures now stand out very conspicuously on the broad, monotonous stretches of country, due to the total absence of trees and shrubbery. It is quite generally conceded that home life under such conditions is not extremely pleasant at all seasons of the year, and this undoubtedly accounts for the noticeable restlessness of the settlers in the Great Plains Area.

The successful development of any agricultural locality depends upon substantial, convenient and comfortable farm homes. A home upon the prairie in the semiarid regions exposed to the high winds and the long hot summers, unprotected by trees and shrubbery, cannot be comfortable or attractive to the settler's family. On the other hand a group of trees about the home offers refuge from the fierce heat, relief to the eye, and undoubtedly often decides between comfort and misery for the occupants. But dry-farming does not insure the growth of such protective vegetation. Fruit and shade trees, small fruit and vegetables, all of which are essential factors in home building, cannot survive in these dry-farming

areas upon the natural precipitation. A tree once planted must be faithfully watered and tended or it will soon die. Garden vegetables and small fruits must have a proper supply of moisture at the critical stages in development to insure satisfactory growth. It is necessary then, for the dry-farmer to supply this deficiency in moisture to insure the essential comforts for home development.

It is especially fitting that an organization devoted to dry-farming should concern itself with the problems of home life. Farmstead irrigation for the dry-farmer cannot be considered a luxury. It is a necessity; for home building is the corner stone in the construction of this great dry-farming empire. In working out the solution for this important problem it is well to assume that the dry-land settler is a man of limited means, energetic, and endowed with indomitable courage. Any system for the establishment of more comfortable homes must, therefore, not require large expenditures of money, but may on the other hand involve a liberal portion of his labor.

Our dry-land areas are as a rule too far removed from large water supplies for general irrigation practice, but usually limited supplies from small streams, springs, and subterranean channels are close at hand. Fortunately, throughout the Great Plains Area of the United States, extending from the Dakotas on the north to Texas on the south, there lies beneath the surface an abundant supply of underground water. When wells are put down to pierce these waterbearing strata, water suitable for both plant and animal life may be secured in abundance. It is possible, then, to assist nature to produce some of the essential comforts of rural life through the medium of well-irrigation.

In this great dry-farming empire with the strong persistent winds above and the abundant life-giving water below, the windmill is the farmer's friend. Readily purchased from implement dealers all over the world at reasonable cost, utilizing nature's forces for pumping energy, this ancient, though valuable engine, by its ceaseless, constant toiling supplies water for the domestic animals, furnishes a supply for household purposes, and when care and diligence are exercised, a group of trees, a lawn and garden can be grown about the farm home. The windmill, although backed by centuries of consistent service, is still unappreciated. It is quite generally considered a part of the dry-farmer's equipment, but as yet little has been done to take advantage of its assistance in securing better home conditions. The nature of the machinery and the source of power do not permit a large amount of work to be done at a rapid rate, but when the wind blows, and it always blows in semiarid districts, it lifts to the surface with every stroke of the pump some of this vital water, which, when combined with the rich soil of our Western plains, stimulates vegetation with wonderful rapidity.

The windmill, if properly utilized and cared for, affords a cheap, convenient and reliable power to lift the water from below to meet the needs of the dry-land farmer. Being of standard manufacture it is readily procured at all trade centers, and moreover it is an easy matter to secure

repairs for the few wearing parts. Nature has very kindly provided the source of driving energy. The winds of our arid and semiarid plains are known for their great force and persistency. On these treeless prairies the wind's force blows and drifts the soil, rapidly dissipates the natural precipitation, and greatly adds to the discomforts of the settler in his home. It is undoubtedly considered a natural drawback to the country, but if advantage is taken of this same wind to drive the windmill to pump water, trees can be grown to protect the farm buildings from these unwelcome winds, gardens can be grown to insure a wholesome food supply, and a good lawn about the farmhouse will beautify the premises and offer relief to the eye.

The average windmill complete in place with pump does not ordinarily cost much in excess of \$200. In making this investment, however, the settler should not lose sight of the fact that the machinery must perform important work. There seems to be a general impression that a windmill is a staple article which can be bought and sold like sugar, salt, and flour. In reality a windmill is an engine the same as a locomotive, and its ability to do work depends upon its fitness for the labor it is expected to do. Wind velocities have a great variation, often varying from several miles per hour to 25 miles per hour, within a few minutes. It is apparent then, that the windmill must be able to adjust itself to these varying conditions, and yet be fitted to operate most economically in such velocities as are most prevalent for that particular locality. In the Great Plains Area there are no doubt more hours when the wind varies from six to twelve miles per hour than when the wind varies from twelve to eighteen miles per hour. The wind engine, therefore, should be selected to do its most efficient work in velocities varying from six to twelve miles per hour. Although no general rule can be given for the selection of a windmill it is evident that it is a piece of machinery which must be well fitted for its work if the best results are desired. Depth of well, size of pump, and quantity of water desired are also determining factors which control the selection of the proper windmill.

Two general types of windmill are now in common use; namely, the direct stroke and the geared mills. Direct stroke mills are used more extensively in shallow water localities, while the geared mills seem best adapted to the deep well areas.

To be a friend the windmill must be treated as a friend. All efficient machinery requires some care and attention. The windmill is surely no exception. The bolts holding the various parts together must be kept well tightened and in place. It is now considered good practice to tighten every nut before the windmill is put to use and afterward rivet the bolt heads with a riveting hammer to prevent the nuts from working off under any circumstances. A majority of the breakdowns in windmills are due to loose bolts and the subsequent falling apart of the working pieces.

If it were possible for windmills to be subject to disease, this malady no doubt would be classified as rheumatism. Still, creaking joints, caused

by neglect and exposure, are found on practically all mills. The remedy, lubricating oil, is seldom regularly applied although recovery of the patient by such treatment is rapid and remunerative. In spite of this neglect, together with poor pump leathers and leaky tanks, the windmill labors on even though crying out in its distress, and consistently furnishes great quantities of water for domestic use. But the windmill must do more than this. By tightening up the loose pieces and oiling the bearings more water can be pumped. This water should be utilized to water vegetables for the table and to irrigate trees to beautify the home.

The rate of flow from the windmill pump is naturally very low. If applied directly to the soil only a very limited area can be moistened. On the other hand if this water is collected the product from the pump for a 24-hour period represents an amazing volume. If this is applied to the soil a larger area can be irrigated and more good will result. In order then, to cultivate the friendship of the windmill it is essential for the farmer to construct a reservoir to impound the water and conserve it for its greatest beneficial use. The greater the distance to water the more valuable this water becomes when brought to the surface. That is, the cost of lifting has been greater and in order to realize the greatest benefits and profits from its use every gallon must be carefully conserved.

In the shallow water districts, the windmills pump at a more rapid rate, the water is less expensive, and therefore it is a common practice to use carefully constructed and well puddled earth reservoirs to impound the water. These reservoirs are usually rather shallow and have, therefore, more or less seepage on the sides and bottom and considerable surface exposed to the water-dissipating winds. The rate of pumping being comparatively great, however, these losses by seepage and evaporation are not so noticeable and on this account earth reservoirs are very satisfactory in the shallow water districts.

Where the depth to water is 100 feet or more the rate of pumping is necessarily slower. If this water were pumped into an open earth reservoir it is not likely that the average farm windmill would gain very rapidly over the losses due to seepage and evaporation. In such localities it is preferable and advisable to have smaller, deeper and more water tight reservoirs. Wooden and steel tanks are frequently used, but these are not permanent and are expensive if much storage capacity is required. In recent years concrete has been successfully used for the construction of both water tanks and storage reservoirs. The cost of materials for such construction is moderate and no other cash outlay is required if the labor is performed by the farmer.

A concrete reservoir 20 feet wide by 30 feet long by 6 feet deep will hold practically one acre-inch of water, or in other words, enough water to cover an acre of land one inch deep. This water if carefully applied will give a thorough irrigation to one-third of an acre of land and in some cases a half acre could be irrigated. A half acre of rich Western prairie land, if combined with sufficient moisture, will supply the average family

with more than an abundance of fruit and vegetables for home use. The materials for the construction of a concrete reservoir of the size above described would cost perhaps \$75 to \$100. The labor necessary for construction could be done by the farmer. Such a reservoir would be especially suitable for the dry-land farmer located in regions where the depth to water was 150 feet or less, and where the ordinary 10-foot back-gearred windmill is used for pumping, the reservoir could be filled at intervals of six to ten days.

In regions where the depth to water is in excess of 150 feet the reservoir should be accordingly smaller and of course the area irrigated would be correspondingly less. A concrete reservoir 15 feet wide by 20 feet long by 6 feet deep holds one-half acre-inch of water, and the cost of materials for construction under average conditions would be approximately \$50 to \$60. An area varying from one-sixth to one-fourth of an acre could be irrigated from a reservoir of this size and with a 10-foot back-gearred windmill when lifting water approximately 200 feet this reservoir could be filled once every ten or twelve days.

It is remarkable how faithfully the windmill will serve the settlers if given a fair opportunity. A Kansas farmer in one of the northwest counties where the annual rainfall is less than 20 inches, was able, with a small 8-foot back-gearred windmill and a steel tank, to lift water from his 150-foot well in sufficient quantities to water 50 head of farm stock, afford plenty of cold water for the home and milk house, and with the remaining surplus was able to produce enough vegetables on a garden 75 feet by 100 feet to supply the family of eight. Besides this more than \$30 worth of vegetables were sold in the local markets. Surely such a windmill is the farmer's friend!

Another instance may be cited of the utility of the windmill in building up a comfortable home. In one of the central-western Kansas counties where the depth to water is about 80 feet, an ordinary 10-foot direct-stroke windmill on a low tower operates a three-way force pump to furnish water for a complete and modern plumbing system in the 7-room home. Besides by a proper arrangement of valves the cool underflow water may be forced into a closed concrete tank or iceless refrigerator. This tank, a paradise of coolness, offers storage room for all the vegetables and foods which ordinarily are kept in the family refrigerator. Moreover, the water used in this manner is not wasted. The overflow pipes lead to a system of irrigation ditches which are so arranged as to water a bluegrass lawn, moisten the roots of the magnificent 6-year old shade trees, and also to irrigate a small but well-tended garden tract. This windmill water system has been in operation seven years, and the cost for operation and maintenance has been practically nothing.

It seems logical that every dry-farmer should consider a windmill a part of the farm equipment, not alone as a convenient method of watering his livestock, but more particularly to insure the necessary home comforts for his wife and family. A few hardy trees, a small, well-kept lawn and a good garden will make dry-land homes attractive. If the windmill which

is required to pump water for the farm animals will not furnish sufficient water for both home comforts and livestock, one should be provided particularly for the garden and lawn. It is a paying investment and a necessity for permanent home-building.

Not only will it be found profitable to operate such a plant in the summer, but it can also be profitably operated during the winter season. Western arid soils generally have the property of holding in suspension great quantities of water. Our dry winters are favorable for winter irrigation, and accordingly the windmill should be permitted to operate and pump water to soak the potato field and garden during the dormant season. The shade and fruit trees can also be profitably watered in the very late autumn and early winter. This water, if carefully stored in the soil during the winter, dissolves and holds in solution great quantities of plant food and when the early spring crops are planted vegetable growth is greatly accelerated. The windmill needs no rest and the product of its work can usually be profitably applied to the soil at any season of the year.

It is possible for the dry-land farmer to irrigate more than a small area about the home. Two windmills when pumping into a common reservoir will furnish water to irrigate more than twice the area of one. As the number of mills is increased the area which can be irrigated will grow in an increasing ratio. Three or four windmills and a good reservoir will enable the farmer to irrigate three or four acres or more of land. On such an area the farmer could produce some alfalfa, potatoes and other root crops, besides the usual vegetables and small fruits. Such a plant, although requiring a rather high initial cost for its water capacity, is generally cheap in operation and maintenance and affords a good insurance policy for the farmer's food supply. The money crops on the dry-land farm must be produced by the natural precipitation without the aid of irrigation. Naturally the rainfall is not constant for every year, and accordingly years of plenty may be followed by a series of lean crops. It is during these unfavorable years that the small irrigation plant will be most appreciated as well as valuable as a money maker.

Every farmer of the Great Plains Area should have a windmill. The forces of the wind are now largely wasted. Nature's power is free to the man who will erect a tower and wheel to absorb the energy. With the windmills we must have reservoirs to impound the water until a sufficient amount can be secured for economical irrigation. Too much should not be attempted, but a little irrigation can be very profitably practiced to supplement the natural precipitation; and if the dry-land farmer will practice his modern methods of moisture conservation he should be able to afford the essential comforts of home life.

DOCTOR WORST:

Mr. President: May I just drop a thought here? I have been advocating for a number of years the thought that if we could unite, under state or federal control, and plant a row of trees or two rows of trees east and west across the whole country at various intervals, beginning at the Gulf

of Mexico and extending to the Peace River in Canada, I can think of no one thing that would affect so greatly the climatic conditions in the country and at so little expense. If a man can, by spending \$25 in labor and money, establish shelter belts of this character all over this country, it would seem to me he would be rather lacking in patriotism if he would not be willing to do it. That simple act on the part of one or two, if followed by others, would, I think, work a great revolution in this country. While it might not make it rain any more, it would conserve the moisture. I drop this as a thought, just to devise a plan to plant a row of trees or two rows of trees across the country.

CHAIRMAN WALKER:

We now have a matter of business to come before the Congress. There is a committee here from the International Congress of Farmwomen, and we will now hear from the Chairman of this Committee:

MRS. BELLE VAN DORN HARBERT, of Colorado:

Mr. Chairman: I bring you greetings this afternoon from the International Congress of Farmwomen. We have been assembled in the room above, and I have heard many of the women say it is a shame to miss all of these good programs that are going on below, but we, too, have been having good programs, and discussing topics of vital interest to every woman, whether she comes from the dry-farming of the West or from the exceedingly wet farms of the East and North.

We have been, and are, indebted to the International Dry-Farming Congress for our existence. You helped us to organize when we were just a handful of women gathered together at Colorado Springs, but not having any money. You know farmwomen never have money. I am a farmwoman myself, and am only here from the farm for a little while. So we were not able financially to have a Congress or to organize a Congress of our own. For the last four years we have been working, and we now have a Congress composed of women from all over the United States. Twenty-three states are represented here by delegates. We have had letters of congratulation from seven or eight different nations and the only reason our women are not here from those nations is because of the war.

We have enjoyed our connection with the International Dry-Farming Congress because it helped us to live, but there has come a time now when we feel that our work might be greater if we were not connected as an auxiliary to any organization and we have wondered if we could step out alone. This step will be like a child just beginning to walk, but we hope we can walk alone and we have come to explain this to you, with all good feelings, and I want to say again that we are indebted to the International Dry-Farming Congress for our existence and we would not separate from this organization if it were not for the fact that we feel that our cooperation with you would be greater if we were not an auxiliary.

We would like to have a part of your program, but as I have told you we have our own speakers. We have thought if you could have a program

and have two or three vital messages, then we could, with all courtesy, invite you to our meeting. I am leaving this question to you.

There are two women who will take just a few minutes each and tell you of our willingness to affiliate with the Dry-Farming Congress and to thank you for all the courtesies and privileges you have been giving us for the last four years. Now if Mrs. Ada Carroll Wortman, of Nebraska, will come forward, she will explain her decision and Nebraska's decision in regard to this Congress.

MRS. WORTMAN:

It is with such feelings of kindness and goodwill to you that we have come to explain our position, because if we put this before a few members, it would not be possible for them to give you the entire meaning of our message. We would like to be considered individually as members of the International Dry-Farming Congress. We want to be considered as interested in it. We feel as though we do not need to be an auxiliary to anybody only to cooperate with you, as Mrs. Harbert has said. We desire to take part in your meetings, and it seems as though in the years to come we might be delegates on your floor to take part in your programs and hear and know of what you are doing and you the same with our programs.

So we ask if you will permit us to separate ourselves from you in this way and yet retain our name. If you decline to let us still hold that name provided we decide to separate from you, we are entirely in your hands; but coming to you—presenting this to you—we, as reasonable women ask, "Has not the time come when we are big enough and strong enough to walk alone?" You ought to be glad to see that we have grown to this point when we are big enough to take this step. It will be an experiment with us to a certain extent, but we are willing to try this experiment and we ask you, will you consider this kindly and calmly? I thank you.

MRS. HARBERT:

We have a representative of our Press Association in the International Congress of Farmwomen. We have built up a Press Association representing the women, and we have with us Miss Mary L. Bigelow of Minneapolis, who will say a few words on the same subject.

MISS BIGELOW:

I feel that I can add very little to what Mrs. Harbert and Mrs. Wortman have already said. Last year it was suggested that our meeting had grown to such an extent that it should stand on its own feet. No action was taken, and it was referred to this year and we have approached it in executive session and have talked it over very carefully and I think the attitude of my own state explains the attitude of a good many other states.

When we go to our college and ask them to send some of their best women, they say, "That is out of our section—this is not a dry-farming section." It has seemed wise for the women of this organization to become an affiliated organization instead of an auxiliary organization if that can

be arranged. I think the people who are in the dry-farming section will always affiliate with a dry-farming organization. We have no idea of affiliating with any other organization—simply standing on our own feet; but we will be glad to join with the International Dry-Farming Congress at any time if we are so permitted.

DR. WORST:

Mr. President: I believe this Association of Farmwomen was organized when I was President of this Dry-Farming Congress. I believe I had the honor of delivering the first address before that Association. There is nothing that body can ask for so earnestly that we are not willing to grant, and therefore, in order to expedite business, I move you, Mr. President, that inasmuch as there is a committee now raised for the purpose of suggesting amendments to the constitution, this matter be referred to the committee, and that committee be recommended to bring in a favorable report.

MRS. HARBERT:

Mr. President, it was suggested by some of our women that the paragraph regarding the International Congress of Farmwomen being auxiliary simply be stricken out. It would make it easy for your committee to strike out that paragraph. We voted on that in our executive meeting, and if you could consent to that it would make it very easy.

MRS. WORTMAN:

We do not want to be shut out from the Dry-Farming Congress.

W. I. DRUMMOND, Chairman of the Executive Committee:

The only way this could be done would be to strike out the reference to the auxiliary.

MR. KNIGHT:

May I ask if the resolution has already been passed upon by the Women's Congress?

MRS. HARBERT:

The resolution is awaiting the decision of the Dry-Farming Congress. We had no authority to separate ourselves without first having your permission.

CHAIRMAN DRUMMOND:

They could not withdraw, with our constitution standing as it is, and it will be necessary for this Congress to strike out that portion of the constitution in regard to an auxiliary.

THE PRESIDING OFFICER, MR. WALKER:

It has been moved and seconded that we have a favorable report on this. The motion is carried.

We have a very full program this afternoon and I am going to ask you to give careful attention to it.

The birthplace of irrigation in the United States was in the state of Utah. The first irrigation was practiced in that state about 1847. We have a man with us this afternoon who comes from the state of Utah, who I am sure will be able to entertain us with a very instructive address on "Supplementing the Natural Precipitation by Subterranean Waters."

We will now have the pleasure of listening to Mr. Lewis A. Merrill, Agricultural Commissioner, Salt Lake Route, Salt Lake City, Utah.

Address of Mr. Merrill

SUPPLEMENTING THE NATURAL PRECIPITATION BY SUBTERRANEAN WATERS

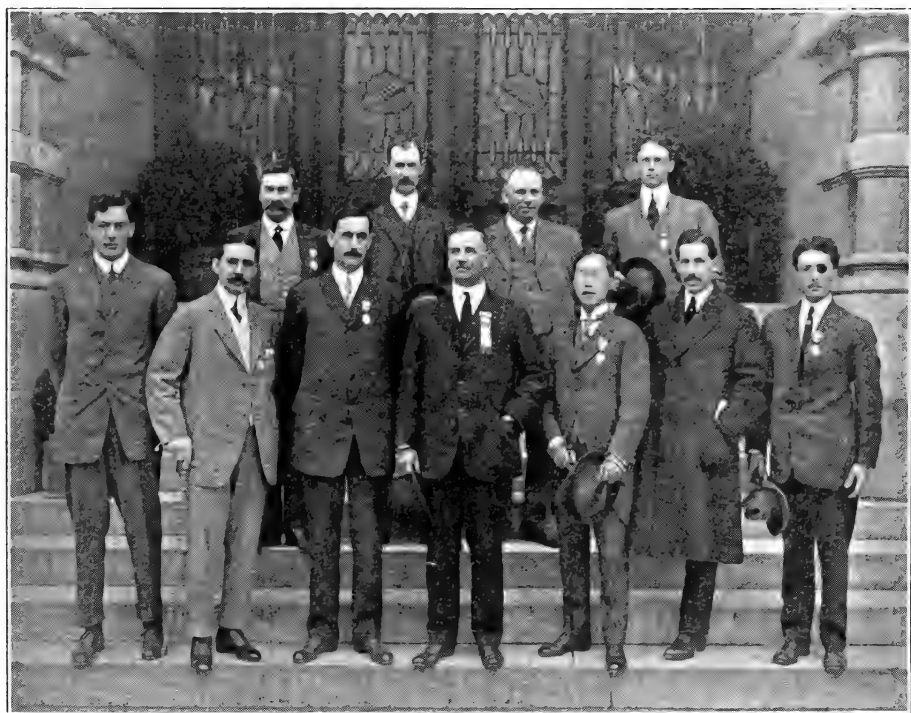
The utilization by pumping of the natural underground waters is bringing in a new era in the agricultural development of western America. It has been remarked recently by a conservative authority that in the future more land will be irrigated by means of the pump than is now irrigated from the natural surface streams.

We have, by no means reached the limit of utilization of our mountain streams. Much of the water now wasted in flood time may yet be made use of by building storage reservoirs. The water now wasted by over irrigation in some of our older communities, may be distributed over more acres and thus materially increase the irrigated area of these communities, bringing a corresponding stimulus to their prosperity. Many thousands of acres of water-logged land may be reclaimed by drainage and a double benefit ensue by providing more water for irrigation. But the greatest single factor affecting our growth agriculturally is the use which will be made of the pump both in raising water from streams to higher levels and in utilizing the natural underground supply which is otherwise lost.

Much of the land which is being developed under the enlarged homestead act for dry-farm purposes cannot be depended upon with our present knowledge and skill, to produce crops profitably. A large part of the land which has been settled upon during the past three years lies in sections where rainfall is very limited and great areas of this land have soil of such a nature as to require more water than is supplied through the natural rains for the productions of good crops. Hence, in such cases there is but one thing to do: Procure water for supplementing the deficient rainfall.

Back in the schooldays of most of us we can remember that south of the Great Salt Lake our geographies showed a vast unpopulated area in many of the textbooks set down as a desert region.

Down along the east of this great area stretched the Wasatch Mountains with their various tributary ranges only partially explored and even the little communities which had sprung up beside the water courses open-



International Representatives at the Ninth Congress at Wichita, 1914



ing out from these mountains were not considered as of sufficient importance to find a place upon the maps.

The greatest body of lands included in this unredeemed section is the Escalante Valley, stretching from its northeast to its southwest limits over a hundred miles through southern Utah.

Rimmed upon all sides by towering mountains this valley with its splendid climate could support the population of a state, yet with the exception of a few acres developed by irrigation systems and here and there the ranch of a persevering dry-farmer, it is actually as virgin soil as that which surrounds the north pole.

The mountain barriers which fringe this great Escalante give to it a watershed of millions of acres from which but a small percentage has been appropriated to the use of man by means of conservation and the diversion of mountain streams.

For long decades this vast expanse has spread out its hundreds of thousands of acres to the storms of winter and the glare of summer sun almost unpeopled save when cattlemen and sheepherders drove their stock down into the bottom of this great intermountain plateau for winter forage, the weather of the mountains or the scarcity of upland fodder having rendered such a move a necessity.

The Escalante Valley, Utah, was attractive to homeseekers throughout the country by reason of the unusual opportunities offered settlers. Most of the land in this section has been thrown open for entry under the provisions of the enlarged Homestead Act; the government offering to give to the settler 320 acres of land. This district embraces an area in Beaver and Iron Counties extending about 90 miles north and south, 40 miles east and west and embracing a territory of approximately 2½ million acres of land.

In the time when old Lake Bonneville stood near its highest level the Escalante Valley constituted a shallow bay of that lake. The flat surface of the valley like that of the Sevier Valley and of the Salt Lake Valley, is typical of ancient lake topography.

The soil varies in character as has been shown by analysis and as is evidenced by the variation in native vegetation. On the bench lands and along the borders sage brush is found, but in the low places grease wood and shad scale predominate. The precipitation varies as much as does the soil and there is also considerable seasonal variation in the precipitation from year to year. The lowest precipitation recorded in the valley was for 1902 at Modena, when but 5.09 inches fell and the highest precipitation recorded was at Enterprise during 1911, when 23.52 inches of precipitation fell. The following table gives annual precipitation in the Valley at three points, though the record is by no means complete:

Precipitation in Inches

Date	Black Rock	Modena	Pinto	Enterprise
1901.....	7.61	9.24	15.10	.....
1902.....	6.38	5.09	11.30	.....
1903.....	13.36	6.93	10.40	.....
1904.....	6.39	9.83	.....	.....
1906.....	.....	19.06	25.60	.....
1905.....	14.28	12.39	18.95	.....
1907.....	.....	12.80	.....	.....
1908.....	.....	16.62	18.5	19.85
1909.....	.....	11.49	12.48	16.17
1910.....	8.89	9.50	14.95	23.52
1911.....	6.85	10.46	14.28	.....
1912.....	8.34	10.07	.....	.....
1913.....	6.17	8.51	11.34	.....

In this section the precipitation during July, August and September is greater than for any other season of the year, the monthly precipitation at this season being from 2 to 4 inches. The climate is equable and the record for sunshiny days shows that there are very few cloudy days. Owing to the elevation (about 5,000 feet), the heat of summer is not oppressive and we do not have here long dreary rainy seasons. The mountains surround the valley on all sides and protect the section from severe storms. The thermometer very seldom goes to zero in the winter and the maximum temperature is about 90 degrees; the evenings are always cool. Plowing is often begun in February, and it is possible in this section to have crops well advanced when the summer rains come on.

Because of the low altitude of the surrounding mountains few streams reach the Escalante Valley. Aside from Iron Springs Creek the only permanent streams rise in the relatively high mountains to the south; the most westerly of these streams is Shoal Creek which enters at Enterprise in Iron County and furnishes water for irrigation in that vicinity. Twelve miles up this stream a storage reservoir contains the flood water furnishing water for the section around Enterprise. Meadow Creek formerly furnished irrigation water for a small settlement at Hamblin, but at present the water of this Creek is mostly used at Holt's ranch at the mouth of the Canon. Another reservoir has been constructed holding the water of Pinto Creek and this will irrigate a considerable section in the vicinity of New Castle. There is no doubt, however, but that even when all of the available water is stored there will still be hundreds of thousands of acres of land that will have to be reclaimed either by dry-farming or by water secured from subterranean sources.

Possibilities of Dry-Farming

In some sections of the valley, the production of crops without irrigation, but by the utilization of what is known as dry-farming methods has been carried on for several years now. Some years ago an experimental

farm was established at Enterprise. This farm has for a number of years been successfully operated. Yields of wheat as high as 30 bushels per acre have been recorded and one year a yield of 33.6 bushels was secured. Besides wheat, corn, potatoes, winter oats and barley have been successfully grown. During the past year many of the settlers in various parts of the valley have met with varying degrees of success, but there seems to be no doubt that with proper cultural methods employed, the summer-fallowing system and by the adaption of drought-resistant varieties dry-farming will result in the production of various crops.

However, it is believed that if homes are to be built and colonists successfully established that some provision must be made for securing water from subterranean sources.

The United States Geological Survey some years ago made an investigation relative to the underground supply and in a report published in 1911, howed that the valley is well supplied with an underground flow. A flowing well belonging to Mr. John Webster, leading from Meadow to Lund was discovered. Here the surrounding country lies low and is flat except for minor irregularities which have been developed by wind erosion. This well is 1½ inches in diameter, 150 feet deep and yields several gallons of water per minute by natural flow. The San Pedro, Los Angeles & Salt Lake Railroad dug a well at Lund in 1903. This well was carried to a depth of 585 feet; the casing is 12 inches in diameter at the top, but is narrowed to 10 inches, 8 inches and finally 6 inches. When this well is pumped it yields 100 gallons per minute. At Beryl, south of Lund, the railroad well is 13 inches in diameter and 208 feet deep. Water was found at depths of 23 feet, 180 feet and 203 feet. The well as finished draws from the 203 bed from which the water rises within 19 feet of the surface. During a pumping test of 24 hours this well yielded 182 gallons per minute. The water from these wells is used in the boilers of the locomotives.

Numerous wells have been dug throughout the valley during the past few months and most of these will yield water of fairly good quality and as shown by analysis, is fit for culinary use or for irrigation. The exception is formed by use of the dug wells in the shallow water tract, the water from which, like the soil in these same tracts, is heavily charged with alkaline salts.

From an investigation of the work done in this valley I do not believe that flowing wells are likely to be of much value in furnishing water for irrigation. It is believed, however, that on land which lies higher than the alkali desert flats considerable irrigation water in the aggregate can be recovered by pumping from moderate depths and that sufficient water can be secured on many of these lands to irrigate a small orchard, some shade trees and shrubbery surrounding the house, a small patch of alfalfa and furnish sufficient for culinary use. With this idea in mind the officials of the Salt Lake Route recently secured the cooperation of various agencies, including the State Agricultural College, Irrigation Bureau of

the United States Department of Agriculture, the State Conservation Commission and various implement houses and these cooperating with the railroad and the farmers themselves have established two demonstration farms.

Farm at Malone

At Malone on the main line of the San Pedro, Los Angeles & Salt Lake Railroad, 189 miles from Salt Lake City and 595 miles from Los Angeles, a 10-acre demonstration farm has been established. The land was secured very late, but through the cooperation of the various agencies was cleared, plowed and crops seeded during the season of 1914. In addition to a small orchard the following crops were planted: Barley and alfalfa, wheat, oats, potatoes, corn, peas and oats, peas and barley and a wide variety of garden crops. At this point, too, a considerable field of beans was planted. The farm was laid out so as to enable various methods of irrigation to be employed. Portions of the field were planned to be grown by dry-farming—receiving no irrigation whatever—other portions of the field were to receive a very small irrigation, but other portions were to receive large amounts. The most profitable utilization of the water was to be determined. A well was dug and water was encountered at 48 feet. At the present time there are 12 feet of water with four 8-inch pipes driven 3 feet below the bottom of the well tapping a second stratum of water-bearing gravel, with water under pressure. When the water level in the well is lowered each pipe discharges a heavy flow and pumping tests have demonstrated that we can secure with this well a steady discharge equal to 390 gallons per minute or nearly .9 of a second-foot of water. Mr. L. M. Winsor, Irrigation Engineer employed jointly by the United States Department of Agriculture and the Extension Division of the Utah Agricultural College, has had immediate supervision of these farms and Mr. Winsor reports that the flow from this well (.9 of a second-foot), is sufficient to give 3 good irrigations 130 acres of land in 3 months, pumping 12 hours per day and during 6 days of each week. The engine used is a 15-horsepower crude oil engine and the pump is a 4-inch vertical, centrifugal Byron-Jackson. Sufficient tests have not been made to enable those in charge to determine definitely and accurately the cost of raising this water. Sufficient progress has been made, however, to demonstrate the entire feasibility of this method of irrigation. There is no question but that the homesteader can employ this method to marked advantage in the irrigation of crops intended to be intensively cultivated. With sufficient water to insure the farmer against seasons of low rainfall there is no question but that a home can be successfully established. It is believed that if but 20 acres of each homestead be placed under irrigation, the remainder of the farm can be profitably planted to rye, barley, wheat and corn. The construction of a silo and the utilization of silage for dairy cows and hogs makes possible the establishment of a farm along the most improved and intelligent systems of management.

The Nada Farm

At Nada the farm, as at Malone, lies adjacent to the line of the San Pedro, Los Angeles & Salt Lake Railroad. Here the farm consists of 12 acres and during 1914 was planted to various crops including wheat, barley and alfalfa, oats, potatoes, corn, kafir corn, milo maize, etc. Water was encountered at 22 feet here and the well was sunk 10 feet deeper so as to give a 10-foot depth. The well at Nada by actual test supplies 100 gallons per minute or .2 of a second-foot. This means sufficient water, according to Mr. Winsor, to supply three acre-inches every month to 24 acres of land. At this place we have a 6-horsepower gasoline engine with a 4-inch horizontal Byron-Jackson centrifugal pump. It is our purpose to sink this well still further since the equipment there is sufficient to throw one acre-inch per hour. It is estimated by Mr. Winsor the cost for irrigation will be from 15 to 17 cents per acre inch or from 45 to 70 cents per irrigation allowing three acre-inches of water per acre. From tests made both at Malone and Nada it is shown that the supply of irrigation water is practically inexhaustible.

The significance of this work lies in the fact that it is certain that a man can go into the Escalante Valley and in a few years succeed in establishing a farm home and become financially independent. The soil is rich in all the elements of plant food and the demands for meat products are far in excess of the ability of Utah farmers to supply. This section, is particularly well adapted to livestock production. The Escalante Valley has ideal climatic conditions and inexpensive feeds. There is no reason why the production of hogs should not be a leading factor in that valley.

Utah has in the past received very small increase in her agricultural population from outside. Only 67 years have elapsed since the first irrigation ditch was taken out by the pioneers here in Salt Lake Valley; since that time marvelous results have been achieved, but so far advantage has only been taken of the water easily secured. Few attempts have, as yet been made properly to store it and the field of possibilities of securing water from subterranean sources is yet unexplored. The establishment of farms at Malone and Nada and the demonstration of the feasibility of securing water has removed all doubts and the employment of this system of irrigation will, in the writer's opinion, mean the reclamation and development of much more land in the state of Utah than is at present cultivated.

The use of the pump in irrigation is conducive to a much more economical use of water than is done under the gravity system. The influence this will have in fostering development under our streams will be immense when the pump comes into more common use. Out of the work begun this season will grow a new and better irrigation and dry-farming practice.

CHAIRMAN WALKER:

It affords me great pleasure to present the next speaker. Mr. H. M. Bainer, of Amarillo, Texas, is Agricultural Demonstration Agent for the

Atchison, Topeka & Santa Fe Railroad. He is accomplishing a great work in the Southwest. He is a Vice-President of the Congress.

Mr. Bainer will now address us:

Address of Mr. Bainer.

SUCCESSFUL DRY-LAND GARDEN.

That a successful garden is a necessity on the dry-farm, there cannot be the slightest question. In view of the fact that the right kind of garden will furnish fully one-half of the living, it resolves itself into an item worthy of closest consideration, and no farmer who seeks after maximum success, can afford to ignore so important a matter.

The statement that the "farmer feeds the world" is not older than it is true, but when in the light of this truth, we stand face to face with the startling fact that he does not feed himself and family, there is just cause for wonderment and question, and we find this condition prevailing all too extensively, especially on the dry-land farm.

It is manifestly unfair to the farmer's friends, the cow, the hog, and the hen, that they should be called upon not only to furnish cash for the purchase of those articles impossible to the average farm, such as sugar, coffee, tea, clothing, books, papers, etc., and then in addition, the common vegetables, including potatoes, turnips, beans, peas, and even melons and fruit, often seen loaded on the farmwagon as it leaves town for home. When such conditions as are here described prevail, something is radically wrong, and it is to suggest remedies for these, that we would engage this afternoon.

Do we hear the question: "How is the farmer to produce this garden?" In beginning my task of answering this perfectly legitimate question, I would remind my questioners that water constitutes a high percentage of the common vegetables, and hence that the abundance or scarcity of this element practically controls the yield. None will attempt to deny that soil fertility is an element in production, but no matter how rich the land, moisture is the controlling factor. It is out of consideration of this fact that I shall give my time largely to the water supply and its application.

Deep Plowing—Experiments and demonstrations have proved that it is easier to control soil moisture in a properly prepared seedbed: One that is deep, than one that is shallow, a fact that holds good not only with dry-farming, but also with lands handled under irrigation. What is true of farming, is also a safe rule for gardening. Best results are assured in connection with deep preparation early in the fall or winter. This early deep preparation becomes compact before planting time and does not dry out as quickly as that soil broken later and left loose and open. Again, the early deep plowing accumulates the winter moisture, and is also benefited by the alternate freezing and thawing process through which it passes. Rainfall often comes in torrents in practically all of the dry-farming area, a condition rendering absolutely necessary a deep soil reservoir, if the moisture is to be conserved, and not lost by running off. Evap-

oration claims a high toll from the moisture falling on lands with but shallow preparation, before it has time to sink to a point of safety beneath the surface. Deep plowing also encourages deep-rooting of plants, which is a highly essential feature, if the crop is to withstand a drought. Early deep preparation not only conserves moisture, thus fortifying against drought, but also warms up the land two weeks earlier than spring plowing, and is therefore ready to plant at any seasonable time.

Humus.—In nearly all dry-farming districts, the vegetable matter or humus content of the soil is deficient. It is on account of the lack of this matter, that many soils run together, or become puddly, which is a serious objection and a detriment to gardening. Soil of this character is dead. It apparently has no life in it. It does not work well. Its moisture holding capacity is poor. Its plant food does not readily become available. In fact, it is not in condition for gardening at all. Under garden conditions, this vegetable matter content of the soil should be increased largely, by the addition of well decomposed manure. To plow under green wheat or rye, or better still, green cowpeas, will be found most excellent. Under dry-land conditions, without irrigation, this vegetable matter must be added in small quantities, care being exercised to avoid excessive application at one time. This manure should be well mixed with the soil, rather than plowing it under in layers that are likely to break the capillary connection between the upper and lower soils. The fall and winter seasons will be found to be better for this working in of vegetable matter, in connection with the deep early plowing.

Soil Selection.—Soils that are at least slightly sandy, will be found much better for garden than those that are "tight." "Tight" soils are greatly improved through the addition of several loads of sand.

Avoid Plant Crowding.—One of the first essentials to a successful dry-farm garden, next to the proper preparation of the seedbed, and where it is impossible to irrigate, is that all plants must be given plenty of space. To crowd the rows, or the plants in the rows, is to court failure, and practically to assure it, in advance. For all ordinary garden truck, the rows should be sufficiently wide apart to admit of cultivation with the common farm cultivator.

Seed.—Great care should be used in the selection of seed, especial attention being given to their adaptability to prevailing conditions. In practically all dry-land districts, the early and medium early strains are more perfectly suited or adapted, than are the later maturing varieties.

Hotbed.—The hotbed is indispensable both as a producer of plants for transplanting, and also for furnishing the table with such vegetables as early lettuce, radishes, greens, onions, etc. It is in the hotbed that the early cabbage, cauliflower, and tomato plants will get from five to eight weeks the start of those coming from the seed, in the open ground. The early tomato plants can be ready to bloom by transplanting time, then by setting them very deeply, giving plenty of space in addition to pruning them to from one to two stalks to the plant, not only an early but large crop will be assured.

Crop Irrigation.—A surprisingly large number of opportunities for irrigating gardens in the dry-land districts are overlooked or neglected. The supply for this garden irrigation on dry-land farms may be secured in various ways, including the impounding of storm or flood waters in artificial reservoirs, that pumped from windmills, and also that available from streams. Many dry farms have natural flood water courses in which small reservoirs may be made by constructing earth dams across them. There is seldom a year in which much more storm water than would be required perfectly to irrigate a much larger area than is found in the usual farm garden, is not lost. By selecting a location for a garden below the reservoir, irrigation may be made available whenever necessary. If the garden is on a slope, it should be terraced, as in this way much of the storm water may be prevented from running off. Many times, the garden tract may be located on the lower side of the pasture, or an uncultivated field, with the slope towards it. Then, by plowing furrows in the pasture or field above the garden, storm waters may be conducted onto the garden-tract, practically every time there is rain. By constructing a ditch and headgate at the upper side of the garden, this flood water may be turned on or off at will.

Windmill Irrigation.—Windmill irrigation has been found highly practical on many dry-land farms in connection with gardening. In nearly every instance wells on dry-land farms will furnish through the medium of the windmill, several times as much water as is required for domestic and livestock purposes. In connection with a reservoir and continuous pumping, these wells will furnish an abundant supply of water for irrigating from one-fourth to one acre of garden under the furrow method. The enormous water loss due to surface evaporation, renders the construction of a reservoir with as little surface and as great depth as possible thoroughly desirable. For earth reservoirs, the best depth has been found to be from four to six feet, and to prevent seepage, it has been shown to be advisable as well as practicable to cement-line many of these reservoirs. Puddling by means of trampling the bottoms of these earth reservoirs with livestock, has been found to render a major number of these constructions seepage proof. This puddling of the bottoms and even the sides must be done while the earth is thoroughly wet.

Applying the Water.—When and how to apply water to these gardens are questions troublesome to the dry-land farmer. In answer to these questions, I would say that demonstrations have proved that irrigation of the garden tract during the winter, is profitable. This is better accomplished by furrowing the tract with a lister or plow from three to four feet apart in the land that has been deeply plowed only a short time before. These furrows should be "laid out" so they can be filled, and the water have time to soak in or penetrate, rather than run out at the other end of the furrow. Through this winter irrigation, the ground is assured an abundant early moisture supply, which will usually last for ordinary truck farms until late spring or early summer. Winter irrigation places the ground in excellent condition for the beneficial effects of alternate thawings

and freezings. As soon as the ground is in condition to work after irrigation, the furrows should be leveled by use of a cultivator or disc, taking care to leave the surface sufficiently rough to prevent blowing. Best results on subsequent irrigations come from running the water into furrows between the rows, rather than by flooding the rows proper, as there is a strong tendency to scald, and crust formations of soil follow a general flowing of the entire surface. And it should be remembered that best results are secured in connection with irrigation where water is applied late in the afternoon or early in the evening, rather than in the forenoon, or at any time earlier in the day.

Subsurface Irrigation.—The ideal method of applying water to gardens, especially those of the dry-land districts, is by the subsurface plan or system. By this method, the water is conducted to a depth of from twelve to fourteen inches below the surface through some form of clay, cement or wooden boxes, provided with open joints or open on the underside so that the water may be readily released. These conduits, tiles or boxes should be placed connectedly and range parallel to each other not more than six feet apart, for average soils, and I am convinced that even a distance so short as five feet between these lines of water-distributors, would be better. These lines should be placed almost on a level, with not over one-half inch fall to the rod; the tile or box need not be more than two to four inches, inside diameter. The expense of a sub-irrigation system is almost prohibitive, in first cost. The advantages of the system are seen in a saving of fully fifty percentage of the water required, as compared with surface irrigation. Very little labor is required in distributing water by the subsurface method, and no soil crusts are created. Less work is required to keep the garden in perfect condition, and the water may be applied at any time of day.

Cultivation.—Under irrigated conditions, cultivation is fully as necessary as under dry-land conditions. Too much dependence should not be placed on the irrigation, as too much irrigation and too little irritation do not bring desired results. The soil should be thoroughly stirred, following each surface irrigation. To break crusts as often as they form, means not only a saving of moisture, but also makes plant food available, and destroys weeds in their germinating stage.

CHAIRMAN WALKER:

We had hoped to have with us the Director of the Arizona Experiment Station, R. H. Forbes—but his place will be well filled by Andrew Kimball, Chairman of the Commission of Agriculture and Horticulture of Arizona.

Address of Mr. Kimball

SCIENCE OF IRRIGATION MADE GOOD

The general impression of the tourist crossing Arizona enroute to the coast is that Arizona is indeed the "Arid Zone," and nothing but a desert; but truly the meaning of "Arizona" is "Living Water."

Real Arizona, the agricultural section, is not seen from the car windows, as both the Santa Fe on the north and the Southern Pacific on the south pass through the desert.

There are in the neighborhood of 8 million acres of irrigable land yet in Arizona untaken, thousands of square miles of stock range, and one of the greatest timber belts in America. The vast field of industry has scarcely been explored. Arizona stands second to none in copper production, and, therefore, has an unsurpassed market for all the farmer can raise.

In speaking of the cultivation of the soil under the science of irrigation, either by the application of the running stream or by the conservation of rainfall,—scientific dry-farming,—I presume I am within the limits of my subject and in keeping with the splendid purpose of this great Congress.

Arizona without irrigation would indeed be a desert and not unlike the picture generally drawn by tourists; that it is nothing but a desert of sand with nothing but the product of cactus, the mesquite and the sagebrush, inhabited by savages and cowboys, with the lizard and the gila monster, but this is not so. Arizona stands today as one of the most progressive states in the Union, though but a child, the baby state. She has, I presume, more undeveloped resources yet to be brought under the touch of man, than any other section of its size in the world. But what she needs is just what she is getting, and that is a scientific course of training and bringing into use of her untold resources by scientific touch and by capital.

It is comparatively but a few years ago when the prospector honey-combed the mines for the rich deposits of copper, and that the Indian and cow ranger occupied the country. The pioneer soon followed, and with the science of irrigation commenced to reclaim the wasting plains and valleys.

In those early days, not more than a third of a century ago, parts of southern Arizona were susceptible to dry-farming, as the great Creator had designed. The grass, like a blanket, covered the face of the earth and conserved the moisture, like a sponge, soaked up the rainfall and held it for the teeming vegetation, but man, made in the image of the Creator, wasteful, reckless, selfish man, caring nothing for the future, but bent on skimming the cream, turned his herds loose to destroy. Soon what was God's green earth became a wasted desert, the cow trails to and from the watering places were followed by the floods, and soon after the rain fell it ran off, depriving the vegetation of its needed moisture and tearing the country into great gorges.

Now it is our purpose to repair those several wasted places by the science of irrigation, and by the untiring industry of man get back what by the recklessness of man, has been lost. Mark the change.

From the great Imperial Valley, the wonder of the world just across the river in eastern California on the west, to New Mexico and western Texas on the east, all the way through southern Arizona, but generally

lying off the railroads, is a series of fertile valleys and plains unsurpassed in fertility in the world.

When you take into consideration the many and varied products as shown in the farm products Exposition here with the Dry-Farming Congress—and by the way, Arizona carried off the silver trophy as you know, for the best exhibit in competition with fourteen states and Canada, as also thirty-two other prizes for products, you must know that the "Land of Living Water," Arizona, is going some.

When the good farmers in this section of the country are toasting their shins, we are picking our oranges and grapefruit, and when the first breaking up comes in the spring from under the fallen snows, out there we are gathering canteloupes for the Eastern market. Our navel oranges are first on the New York market, and bring \$6 a box, the choicest that are raised in the world today. Aside from the fruits named, there are dates, figs, and olives; and at the same time we are producing the hardier products.

Tempered by the influence of the snow-capped mountains, and the cooling pines, though warm enough to produce tropical fruits, the climate of Arizona is very healthful and invigorating. There are nearly 360 sunny days in the year.

While attending the Transmississippi Commercial Congress in Saint Paul a number of years ago, a short time was allowed each delegate who wished to speak of his own state. I was telling of the wonderful products of the Gila Valley, the southeastern portion of the state, and particularly of a wonderful sweet potato which weighed $36\frac{3}{4}$ pounds, while its mate in the same hill weighed 19 pounds. A big, brawny Missourian at the other end of the room got up, yawned, stretched, looked over to me, and walked out; of course I could not produce the goods.

Talk about sunflowers, you Kansans are not in it. We raised a domestic sunflower in our yard so large we called it the "Big 4." It measured 14 feet high, was four inches at the base, and its blossom 14 inches in diameter, and it grew in my fore-yard.

The manager of an implement concern in the North with whom I was dealing came to explore this wonderful land of ours. He wanted first of all to see the man who raised the wonderful sweet potato. The old Georgian understood the business before he emigrated. In answer to the question, the Southerner looked up innocently and said, "Well, that portion which we got out of the ground weighed $36\frac{3}{4}$ pounds." "Drive on," our visitor said. After inspecting conditions on the south side of the river, we called on a farmer on the shady side from whom the Hubbard squash was named, I presume. Mr. Hubbard said, in answer to what could be done in the sunny South, that on this land there, he raised 50 bushels of wheat to the acre and on the same land the same season he raised 50 bushels of corn to the acre. At the same time squash grew so thickly we could hardly get around through the patch, and the same year his wife had twins! "Drive on," said the merchant.

It is no unusual occurrence to raise two crops on the same ground in the same year. The Gila river is not unlike the Nile. It carries such large proportions of silts, that when this muddy water is spread over the land there is sufficient organic matter in it to produce two crops without impoverishing the land. After we harvest our grain in May, we can then soak up the land and plant other crops, such as pink beans, corn, milo, squash, and other crops for feed. Corn and potatoes will mature. A farmer on the dark side of the river produced two crops of Irish potatoes on the same land the same year, and from the same potatoes; that is he cut the eyes for planting from the matured first crop and produced a fully matured crop from them. I have seen apple trees blossom the second time in a year. Trees will put forth limbs ten feet long in one year and strong enough for young trees. You may top your cottonwood trees, plant a stick as large as a fencepost, and it will make a tree large as a good-sized umbrella in one season, in time for shade that same year. The thing we have most to contend with is too great growth—keeps us busy cutting back. We do not need much land. A small farm well tilled in this country will make a man rich, especially if he will carry out the wise counsel given at these congresses.

Now as to dry-farming in Arizona, Professor Forbes, director of the experiment station, who was to have made a talk here, does not think there is much doing; but I hold different views and have great confidence in the outcome.

In the northern part of the state along the timber belt, I saw fully matured corn and potatoes and all manner of fodder plants raised with only the natural rainfall. Then in southern Arizona, all the way from the capital to the eastern borders, and south to Old Mexico, nearly every quarter section for five miles out around the stations on the Southern Pacific, San Simon, Bowie, Cochise, Benson, and reaching south for a hundred miles, the best of the land is located and there is no available water supply. It is what is generally understood as dry-farming in the extreme.

When settlers began to come in from the East, I gave them till their money ran out to stay, but they are still on their jobs and are making good. The farmers about San Simon and Willcox got together the best of their products and I was surprised indeed to witness the wonderful products from dry-farming, fully developed corn and cotton, and nearly everything grown. There is all manner of artesian water available in this section.

I have followed colonizing all my life, and for the last 15 years, during my residence in Arizona, I have attended the various National and International Congresses. It was through the influence of the Transmississippi Commercial Congress and the International Irrigation Congress that we have the Reclamation Service. Remember it was but a few years ago that Eastern and Southern congressmen did not think there was much in the West worth while, but we interested them.

We put it up to the East in this manner: You have your manufactured

products, you want a market for them; help us in reclaiming the great West, by conserving the wasting waters, staying the flood, preventing the destruction in the lower lands, and we will convey the water on the untold millions of acres of good land and make homes for millions.

The question of the "Manless Land" being peopled by the "Landless Man" means to unload the congested centers and help them to a home on what was the wilderness of the West.

Manufacturers and businessmen of the great East saw the point; they used their influence with their respective Congressmen, who in turn joined with the Western Senator from Nevada, and gave us the Reclamation Act.

On my way here, I attended the Interstate Irrigation Convention in Helena, Montana, called at the instigation of the Secretary of the Interior. Mr. Lane wisely called together a lot of Western Governors and irrigators to discuss the great questions relating to reclamation.

This Dry-Farming Congress is a factor for good. We can already see results from its deliberations. We are getting together, and thus by concerted effort through these educational advantages coming from meeting in these National and International conventions, will bring under cultivation millions of acres of land now lying idle, and make homes for hundreds of thousands of our race.

CHAIRMAN WALKER:

We have been told that good homes must depend upon good schools, good churches, and good roads, and we are particularly fortunate this afternoon in having with us a man to talk about "Good Roads." This man has been closely related with road problems for a number of years. He has talked good roads, written good roads, and he knows good roads. I take great pleasure in introducing to you Mr. Charles Dillon, managing editor, Capper publications, Topeka, Kansas.

Address of Mr. Dillon ROADS, GOOD AND BAD

Good roads shorten the distance to town. They save wear and they add brightness to life. They encourage thrift. They mean a better agriculture. They make men kinder and women more patient. They take the gloom from schooldays in even the dreariest building, and they give heart and hearers to the country church.

Good roads make it possible to borrow more money when more is needed by increasing the land's value. They keep boys and girls on the farms and induce friendly visiting which results, in some cases, in happy returns.

Good roads are a never-failing source of talk, and no one has said anything new about them for ten years. Good roads make human beings glad that they are alive, but not glad enough to show much keen interest in statistics covering the subject.

Some men—particularly retired farmers who rent their land to others—

oppose the building of good roads if they own land within the district to be taxed. But these men will travel a long way around and open eighteen gates to get on to the smooth road after it has been built.

Good roads are, in one respect, like a good wife. You must take care of a road if you wish to keep it smooth and have it wear well. Neglect your wife and you'll lose her or she'll go to the hospital for repairs.

There's an excuse for almost anything except bad roads. The most inexcusable thing is the failure of men to have good roads when split log drags are so easily made and so easily used.

"Let me live in a house by the side of the road and be a friend to man," was written in Massachusetts where good roads ideas began long before Mr. Bryan started to run for things. No one could be a real friend to man, with a kindly smile and a ready hand if he lived in a house by the side of a bad road. Bad roads and good spirits will never be found together. Bad roads and tenantry; bad roads and poor churches and schools; bad roads and no social life; bad roads and discontent—these are combinations always to be encountered.

The Middle-West has been lamentably slow in its road building. If it were not for a few cheerful persons in isolated places we never should have a mile of improvements in some of these states. My private opinion, publicly expressed, is that we have been altogether too easy, too good natured about this business in every part of the country. The farmers are not always to blame for poor highways.

Indeed if every dollar of taxes for the purpose were properly expended there is scarcely a county in Kansas or Missouri in which all the roads might not be improved in three years and the improvement be maintained. This does not mean, necessarily, that money is stolen in all these counties—although it has been stolen in a number of them. It means that incompetent men under the poorest management have squandered or wasted the people's money.

Necessarily a Kansas man will say most about his own state. Do you know that Wyoming—a name that strikes more ears as might Vancouver or Vladivostock—Wyoming, with a population of less than 200,000, has nearly 100 miles more improved highways than has the older, wealthier state of Kansas, with its million and three-fourths population? In Wyoming four percent of the road mileage is improved. In Kansas we have four-tenths of one percent of the mileage improved. Missouri, with its four million population, has only four-tenths of one per cent more improved highways than has Wyoming which so many of us refer to, patronizingly, as the Far West! Wyoming has spent more money and has done more work on its roads than have Arkansas, Colorado, Louisiana, Mississippi, Oklahoma or West Virginia, and it has done as much as Texas, the largest state in the Union!

I often wonder what becomes of the money. The Washington experts say there has been an awakening. I haven't heard a sound to prove it. The reports show that approximately 206 million dollars was spent last

year on public roads in the United States, according to statistics prepared by the United States Department of Agriculture. In 1904 the total was only 79 millions. In nine years, therefore, the increase has been more than 250 percent.

This awakening on the part of the country to the importance of good roads has, the experts say, been due in great measure to the principle of state aid to counties and other local communities. New Jersey began the movement in 1891 when it passed its State Highway Law. Massachusetts and Vermont followed a year later, but for the most part the other states were slow to move. In 1904 only fifteen had state highway departments; today there are only six that have not. In 1913 the individual states appropriated a total of \$38,755,088 to supplement local expenditures and still we have the worst of roads.

The value of this state aid is, however, not to be measured by the figures alone, for the bulk of the money comes, and always must come, from counties and townships. Thus, in 1912, the cash outlay by counties, districts and townships, was \$137,493,985. Complete figures for 1913 are not yet available, but it is safe to estimate the sum at approximately 151 million dollars. To this must be added 15 millions to represent the value of the labor contributed instead of cash in districts where this practice prevails. Last year, therefore, local communities contributed, in round numbers, 166 million dollars, as against appropriations from state treasuries of \$38,755,088. The true importance of this 38 millions lies in the fact that it means expert supervision of the expenditure of a considerable part of the vast sum of 200 millions.

When every county built as it chose and when it chose, the services of trained engineers were usually out of the question. There was little opportunity to test innovations, little advance in the science of road-building, and there was also difficulty in arousing each county individually to do its best to improve conditions within its own limits. State aid has changed all this. The best engineering skill is available for all works of importance, there is cooperation and a constant stimulus to further improvements. The money contributed by the states does not only build more roads, it makes better those that other money builds.

At present there are in the United States 20,741 miles of roads improved either wholly or in part by state aid. Of the 2,226,842 miles of roads in the United States, 223,774 miles, or approximately 10 percent are classed as improved.

To improve the remaining 90 percent may seem a big job. It is, in fact, made possible only because the work really pays for itself. From material gathered by the United States Department of Agriculture, it is now possible to prove not only that good roads are a profitable investments, but to determine exactly what dividends they pay. First and foremost is the reduction in the actual cost of hauling, the plain fact that it takes less time and labor to haul a load over a good road than over a poor one. Less obvious is the effect of improved roads in increasing the

total output of a community. In the case of one county in Virginia where particularly the rough records have been kept, this output was more than doubled. The farmers found that with a market always and readily accessible to them, it paid to work the land to its maximum production.

This explains the very remarkable rise in farm land values which nearly always accompanies road improvement. The rise is not fictitious, or of no benefit to the man who wishes to farm and not to sell. The land is more valuable because it can profitably be made to produce more. In other words, the money that goes into the road comes back with interest from the land.

There is no phase of the road problem more important than that of maintenance. The general impression that there are certain types of roads that are permanent is erroneous. No permanent road has ever been constructed or ever will be, according to the road specialists of the United States Department of Agriculture. The only things about a road that may be considered permanent are the grading, culverts, and bridges. Roads constructed by the most skillful highway engineers will soon be destroyed by the traffic, frost, rain, and wind, unless they are properly maintained. But the life of these roads may be prolonged by systematic maintenance. A poor road will not only be improved by proper maintenance, but may become better in time than a good road without it.

CHAIRMAN WALKER:

We have one more address on our program, and this will be an illustrated lecture by Edward C. Johnson, Superintendent of Institutes and Demonstrations, of the Kansas Agricultural College, Manhattan, Kansas.

Address of Mr. Johnson

THE AGRICULTURAL DEMONSTRATION MOVEMENT

The demonstration movement is the most recent development in the field of agricultural education.

It has been preceded by the oldtime farmers meetings and farmers institutes where agricultural subjects were discussed in lectures and exhortation in public meetings. The modern farmers institute organizations where communities band themselves together in permanent associations for educational purposes, these associations being addressed not only by representatives of agricultural colleges, but by local speakers drawing upon the results of practical farm experience, early training, or home study, and so-called "movable schools," or "short courses," have been its more immediate predecessors. Lectures and addresses about agriculture have been and are powerful agencies for the promotion of sound agriculture, but the need for illustration and demonstration has become more and more evident.

The demonstration movement, therefore, where the field, farm, and home serve as the laboratory is the natural result. Its advent was foreshadowed in the earlier institute work where the man with the greatest

fund of experience and illustrative instances was the most successful lecturer; by demonstration trains where livestock, crop exhibits, silo models, charts, etc., were used for demonstration purposes; by educational agricultural exhibits at fairs; by exhibits and demonstrations at movable schools and short courses, and by special demonstration days in towns and communities. It was foreshadowed also by the revolution in methods of teaching the natural sciences in colleges and secondary schools, where the didactic lessons and lectures have given place largely to laboratory demonstrations and practical work. It is but a natural development, therefore, in the method of bringing agricultural education to all the people, a development the possibilities of which have but recently begun to be understood.

A Utilitarian Movement

The purpose or driving force in this demonstration movement is fundamentally utilitarian. Were it not that a large percentage of our population already has recognized the need for greater and more economical farm production and for more efficient and less extravagant distribution of farm products, the movement would have been slow of development indeed. The prospect of increased production has appealed to the consumer, and that of more economical production with less waste in distribution has appealed to the producer, and each one is looking to the demonstration movement to further his own cause.

This fundamental utilitarian motive must not be lost sight of during this early development of the demonstration movement, because in so far as it succeeds in accomplishing at least in part what is expected of it, just so far will it be considered successful and gain a permanent place in the educational system.

The Directive Agencies

The immediate need of any movement as large and important as the demonstration movement is organization to direct the forces set in motion. The first organization for this purpose in this country was the Office of Farmers Cooperative Demonstration Work of the United States Department of Agriculture, which in 1904 undertook to direct demonstration work in cottongrowing in the South, a work originally designed to meet the emergency presented by the invasion of the boll weevil. Its efforts in demonstrating to the rural population of the South methods of growing cotton under boll weevil conditions brought such striking results that those in close touch with the situation claim that in three years after work was started the weevil-infested area had recovered from its demoralization and acquired as great prosperity if not greater than before the weevil infestation, and almost a normal cotton crop was again being produced. The scope of the movement has since broadened so that it now includes not only demonstrations in cottongrowing, but also in the production of corn, legume crops, winter cover crops, and livestock and in general diversified farming.

There are now 765 demonstration agents in men's and boys's work in

the South, and 358 in women's and girls's work, with a grand total of 1123. In the North the movement commencing six years later with the appointment of Mr. A. B. Ross as County Agent in Bedford County, Pennsylvania, was directed in part by the United States Department of Agriculture, though agricultural colleges, railroads and local organizations of farmers, bankers, and commercial men were largely responsible for the spread of the propaganda concerning farm demonstrations and for their general direction.

We find the agricultural colleges and associations, such as the Crop Improvement Committee and the bankers associations of the various states, railroads, individual banks, the commercial clubs, and farm bureaus, intensely interested and promoting the movement until there are already 254 agricultural agents in the Northern and Western states, devoting their entire time to teaching better agriculture by practical suggestions and demonstrations. The movement is still in its infancy and there are no set rules or plans by which to carry it along.

The general tendency seems to be, however, to place upon the local community where agricultural demonstration work is to be conducted as much of the responsibility for its direction as possible as well as responsibility for such needed financial support as is not furnished by the United States Government and the various states and counties.

The Farm Bureau

In the North and West the movement has centered largely in so-called "agricultural clubs," or "farm bureaus," organized primarily for the purpose of demonstrating and putting into practice modern methods of agriculture. These differ in the details of organization and management in the various states, but the general plan is that of a close organization of not less than one hundred farmers in a county to several hundred, paying an annual membership fee ranging from fifty cents in some states to \$5 in Kansas and \$10 in some bureaus in Illinois. The bureaus have their own officers, executive committees and other necessary committees, and their own offices.

All the bureaus have practically the same primary purpose—the improvement of agricultural conditions through increased and more economical production and a less wasteful system of distribution of agricultural products. In practically all cases the farm bureau has secured a man agriculturally trained to take the lead and devote his whole attention to its work. This man usually is selected by the agricultural college of the state in which the farm bureau is located and his name presented for approval to the farm bureau which he is to serve before appointment is made. In some states, notably Wisconsin, he is selected by the agricultural college with little, if any, reference to any farm bureau. In such cases he is regarded strictly as a college representative. In most states, however, even though the agent is selected by the agricultural college and is largely responsible to it for the kind of work undertaken and for its method of prosecution, in order that his work may be most effective and

the greatest interest of the community enlisted, he does his work after conference and consultation with a representative executive committee from the farm bureau.

Types of Demonstration Work Undertaken

As to the types of work undertaken by these bureaus and agricultural agents, there is great variation. In many cases the chief emphasis is placed upon accumulating information as to the best methods of conducting farm enterprises already in practice in the county and in promoting the wide-spread diffusion of this information among the members of the farm bureau and of the county at large. In other cases it takes the form of demonstrations in crops and soils, based upon the positive results of sound experimental work of the various experiment stations and the United States Department of Agriculture, and calling the attention of the farmers of the county in every way possible to the results on the farms where these demonstrations are in progress.

Again in some counties careful surveys of the organization and business side of farming are made and the best organized farms used as demonstrations in efficient management. In still other instances farm bureaus have given much of their time to the exchange of breeding animals, purebred seed, etc., in order to increase the production of livestock and crops by the use of better bred livestock and purebred seed. Again many bureaus have been largely instrumental in bringing the farmers together in cooperating groups for the purchase of farm materials and the selling of farm products. The latter form of bureau is emphasizing largely economy in distribution; the former, economy in production, and both are legitimate in so far as they are instructional in character and for the purpose of creating high ideals in the art and business of farming.

Many farm bureaus also are giving a great deal of attention to the social side of farm life, the promotion of social clubs, picnics, homecomings, etc., while others are emphasizing their educational work through schools and boys and girls contests and clubs. The latter is a very valuable phase of the agricultural demonstration movement.

Representative Results of the Demonstration Movement

That the demonstration movement through farm bureaus and agricultural agents is bringing results both numerous and striking is appreciated by everyone who is in close contact with demonstration work. These results cannot easily be expressed in dollars and cents. We might just as well try to give an estimate of the value of schools, churches, etc. An attempt has been made, however, to estimate the increased yields on the demonstration plats of corn and cotton in the South in 1911, aggregating an area of 279,379 acres. It is stated that on these plats alone the value of the increased yields of these two staple crops at current prices was \$2,479,694. This takes no account of the work among the boys and girls, and 50,000 other cooperators who did almost as well as the demonstrators. Even if we leave all monetary estimates out of consideration, the results are very noticeable and often striking. As an example, a farm bureau

in Leavenworth County in this State, which has been in existence for two years has waged an educational campaign relative to the life history and the methods of prevention of the Hessian fly. After the first year's campaign only about 10 percent of the farmers observed the best known methods of wheat culture for preventing ravages of this insect. After the second year's campaign 70 percent of the wheat acreage in that county was handled according to the suggestions given in the campaign.

The difference in the general information concerning the insect and its habits of life between the county already mentioned and adjoining counties where no farm bureaus and no county agents have been at work is sufficiently clear to an observer to be a striking evidence of what such educational campaigns can accomplish. In counties in southeast Kansas, campaigns for the promotion of alfalfa growing have been prosecuted and correct methods of draining, liming, inoculating, and preparing the seedbed have been conducted. In these counties where two years ago few, if any, alfalfa fields were to be found, small fields of alfalfa successfully grown may be seen here and there as demonstrations of what can be done and as forerunners of a large alfalfa acreage to come. The educational campaign on alfalfa in these counties has been successful, and the best methods of alfalfa growing known to date will soon be common knowledge.

The results have been so quietly accomplished that few will recognize that the alfalfa is there as a result of the propaganda of the farm bureau and the agricultural agents. A third striking instance of demonstration work is the grasshopper prevention campaign in western Kansas in 1913.

The district agricultural agent of southwest Kansas convinced the county commissioners of one county that the ravages of this pest could be stopped with the use of poisoned bran mash prepared and distributed according to the directions of Professor Dean of the Kansas State Agricultural College. The commissioners decided to use some of the county funds to buy this poison and to invite the farmers on a certain day to come for it to the nearest town and to distribute it over their farms. On the appointed day, hundreds of farmers were present with their teams, hauled the poisoned bran mixture home and used it on their fields. Grasshoppers by the millions perished and their devastating sojourn in that county came to a close. As a result of this demonstration, eleven other western Kansas counties did likewise and an unequaled lesson in cooperative insect control was learned by thousands of farmers.

The results of the aggressive silo campaigns conducted by every agent need but be looked into to be appreciated. During the year 1913 on the basis of actual figures secured from the agricultural agents, 216 above ground silos were constructed as a direct result of their activities, and a little more than 300 pit silos were similarly constructed in western Kansas. Since then the pit silo idea has spread with wonderful rapidity over the prairie from New Mexico to the Dakotas, and thousands of pit silos have been constructed. It is now no longer necessary to argue for the construc-

tion of a pit silo, but rather to give suggestions concerning the best methods of constructing them and how to feed silage.

These definite results here mentioned are more or less spectacular. They are no more fundamental than the more inconspicuous results, such as the general educational work which is being accomplished by the demonstration meetings and campaigns of various kinds which are always in progress. Numerous instances of the results of such educational work are evident in every country having a farm bureau and every district where an efficient agricultural agent is employed.

A farm bureau and one or more agricultural agents in a county will focus the attention of the people of that county upon agriculture as nothing else can do and in proportion as the attention of the people is thus directed in the same proportion they will be wideawake to the abundant agricultural literature found not only in bulletins from the experiment stations and the United States Department of Agriculture, but in the exceedingly valuable farm journals coming to the rural homes from week to week. That information thus gained by personal study is followed by action in a large percent of cases is certain.

Demonstration Movement State and Nation Wide.

The demonstration movement is not limited to farm bureau work, but is state and nation wide. In every state where any considerable number of county agents are employed, the need for specialists on the staff of the agricultural colleges to support the county agent work and to conduct state-wide demonstrations along various lines is keenly felt. Consequently, the extension forces are being augmented by specialists in all important lines as far as funds and eligible men permit. Many of these conduct demonstrations in certain districts of the state much as the demonstrations are conducted in the counties by county agricultural agents. Others spend some time in holding agricultural meetings on farms where the illustrative material is close at hand, in this way reinforcing the lecture work with laboratory illustration. Other agents spend much of their time helping the agricultural agents in solving problems arising in their counties with which they are not entirely familiar. No agent, of course, can expect to be a specialist in very many lines of agricultural practice, although he is supposed to know one or more lines of work thoroughly and to have a fair general information in most of them. He must, therefore, call upon other specialists in places where he himself is weak. The county demonstration movement through farm bureaus and the statewide demonstrations, therefore, are reinforcing each other.

Support of County, State and Nation Needed.

It has been the general history of many educational movements that at the start men who have seen the need of them have helped to finance them, and later, when the people as a whole have recognized their value, their continuation has been provided for by appropriations of public funds by county, state, and nation. This has been true of the demonstration movement in the South, where counties and states are lending a helping hand

with public funds. Even in the North where the movement is most recent, the majority of the states already have laws providing for state or county appropriations, or both. In some states, notably Wisconsin, Indiana, and Minnesota, the appropriations by county, state, and nation are sufficient to pay not only the salaries of the agricultural agents employed, but a large part, if not all, of the expenses of the farm bureaus. In other states, such as Kansas, South Dakota, Montana, and California, the movement thus far has not been supported by public funds except funds appropriated by the Federal Government. In these states the burden is falling upon the farmers themselves, railroads, the businessmen of the various towns, associations of bankers, and commercial bodies.

That the demonstration movement has found a permanent place in the educational system cannot be doubted. As such it needs to be placed and will be placed upon a permanent basis financially. This can be done only when county, state, and nation assume a large share of the financial responsibility for its prosecution.

CHAIRMAN WALKER:

The Congress will be at recess until 8 p. m.

WEDNESDAY, OCTOBER 14

NIGHT SESSION

International Night

PRESIDENT WATERS:

This, as you know, is the International Program, the evening being given over to our guests from other countries. We feel very highly honored indeed to have these countries represented, and represented by the very able men who have come to our Congress, and have taken already such a prominent part in its deliberations and discussions. It is a great compliment to us and a great pleasure to us to have them here as our guests. We have certainly profited greatly by our associations with them, and it is our hope that they may have derived as much profit and pleasure from coming here as we have derived from having them here.

The presiding officer for the evening was to have been the Minister of Agriculture of the Province of Saskatchewan, Canada, but he is seriously ill at the present time and unable to come. He has asked us to accept Mr. A. F. Mantle, Deputy Minister of Agriculture, Province of Saskatchewan, Regina, Canada, as his personal representative and substitute, and I have great pleasure in introducing Mr. Mantle as presiding officer of the evening.

MR. MANTLE:

Mr. President: I shall read the letter from Minister Motherwell's secretary to Secretary Faxon:

Regina, Sask., October 9, 1914.

R. H. Faxon, Esq.,
Executive Secretary-Treasurer,
International Dry-Farming Congress,
Wichita, Kansas.

Dear Mr. Faxon:

I regret very much to have to advise you that owing to another attack of sciatica, Mr. Motherwell will not be able to go to Wichita. I am sending you a lettergram tonight stating that Mr. Mantle will be with you in place of the Minister. Saskatchewan will also be represented by Professor Bracken of the College of Agriculture. Immediately the session of our Legislature closed, Mr. Motherwell had to leave for Winnipeg in connection with public business, and ever since his return from that city, he has been confined to his home at Abernathy by a fresh attack of sciatica. I deferred writing to you in the hope that he would feel able to go but he would simply have had to go on crutches if he attempted it.

Mr. Motherwell has directed me to convey to you and through you to the Congress his profound regret that he has at the last moment been obliged to relinquish all hope of standing shoulder to shoulder with the Old Guard at this time. The Minister feels that Saskatchewan will be well represented by Professor Bracken and Deputy Minister Mantle.

In conclusion permit me to express to you Mr. Motherwell's best wishes for a thoroughly successful Congress in every way.

Yours very truly,

I. J. CUMMINGS, Secretary.

Reference has been made on more than one occasion during the past few days to the hope that possibly the greater part of the arid acreage of the known world would be treated to what we know as dry-farming methods, if that acreage is to be productive, is to grow crops for the use of man.

Dry-land area is not confined by any means to the western or mountainous parts of the United States, or to the western provinces of Canada. These are all dry-farming regions on this continent; but there are corresponding regions of dry lands in almost any other continent, and of course, on some of the other continents practically all of the land is what we know as dry land, that is, it receives less than 20 inches of rainfall annually.

As this is an international Congress, it would be international in name only if the representatives from other countries in which there is an excessive area of dry land, were not given their proper place on the program, and I am satisfied that those who are gathered in this hall tonight will be well pleased to have this opportunity of hearing at first hand of the conditions under which dry-farming is practiced in the countries that will be represented by the speakers this evening.

It has happily not been the custom of the various members of the Congress called upon to preside to make speeches, I think, and as we have a

very beneficial program for the evening, I will not trespass on your time at all, but will proceed immediately with the program for the evening.

The first speaker upon whom I shall call, is the representative of one of the smaller European countries, Greece, a country which, though not extensive in acreage, has compared favorably with other countries of the European continent. Greece goes back in its agricultural history a very long way, and has much in that respect which we may well investigate.

Greece is represented at this Congress by Hector M. E. Pasmazoglu, Grecian Consul-General at St. Louis, and I will now call upon him.

As he has not yet arrived, we will instead, hear first from the Russian Agricultural Commissioner to the United States, Mr. William P. Anderson.

Between Russia and the United States, and Russia and Canada, there has been true reciprocity along the lines of dry-farming methods. I well remember that when a little more than a year ago I was in the city of Antwerp, we met there some of the larger grain dealers of that part of the country, and were interested to learn that the Russian Government was studying and making inquiries along another line of assisting its dry-land farmers, and that it was an improved system of marketing grain. I think I am correct in stating that since that time considerable facilities have been provided to enable the Russian farmers to market their grain and receive higher prices. We were interested in that in Canada, as our government had taken steps in this direction by establishing cooperative farmers's elevator companies, which handled last year upwards of 16 million bushels of our crops, a concern entirely owned and controlled by 12,000 farmer shareholders scattered over the provinces, a concern which was rendered possible by loans from the government which are being paid to the cent as they fall due.

Russia

MR. ANDERSON:

Mr. President: It is a year ago that I had the honor to bring greetings to the Eighth International Dry-Farming Congress held at Tulsa.

At that time I was quite a stranger in this country, in which I have the honor to represent the Russian Ministry of Lands and Agriculture as an Agricultural Commissioner to the United States.

Now I have been honored to bring the greetings to the Ninth Annual Sessions of the International Dry-Farming Congress from the Russian Ministry of Lands and Agriculture, and I do not need to assure you of the great pleasure which I feel from this opportunity.

The Russian Ministry of Lands and Agriculture, realizing the agricultural importance of the United States, has placed an Agricultural Commissioner here with a staff, consisting of an assistant and a secretary, to study the agricultural methods in detail in the United States and to keep in touch with the work of the American Experiment Stations and with the farming progress in this country, with the view to applying the results to similar conditions in Russia; to take charge of the exchange of selected seeds, for experimental purposes and for the mutual benefit of both the American and Russian Experiment Stations, and agricultural workers in

both countries; and to make purchases of farm implements in this country for export to Russia. These purchases are made either for the Russian Department of Agriculture, government or county stores of farm implements, or for individuals in Russia. As we are a part of the Russian Ministry of Lands and Agriculture, our services are gratis. I speak these last words because the named function of purchasing farm implements was sometimes misunderstood by American manufacturers, who thought that we were desirous of commissions, agencies in Russia, and the like. In reality, we desire to place American manufacturers in direct touch with Russian purchasers, and to put in Russia the best machinery.

At the present time after a year of work in this country, and having visited numerous Experiment Stations, Agricultural Colleges, and many farmers, I am under the strong impression of the enormous work done and being done in all the lines of agriculture in this country. I consider that the International Dry-Farming Congress, as one of the greatest agricultural organizations of the present time, is one of the robust levers that moves the agricultural work of this, and also of foreign countries, forward to the progress in scientific and practical agronomy, thus laying the foundation of the country's prosperity. It cannot be otherwise, since vast areas of lands in arid and semiarid regions lie vainly idle because the amount of land which may be irrigated is limited, or by the water supply, or by the cost of reclamation; but those lands are more and more needed for the production of crops. The population is rapidly increasing; our Mother Earth welcomes the dry-farming. The soils of those lands are usually rich in mineral elements of plant-food, and these salts are also near the surface. Those lands can, and the largest part of them must be, made fruitful for homes by the practical application of the science of dry-farming.

Dry-farming includes within its borders the areas of those lands with a large diversity of economic, climatic, and soil conditions. Dry-farming has to deal with those conditions with all the combinations between the different characters of soils, from heaviest clays to lightest sands; with severe drought and limited rainfall in annual precipitation; so the dry-farming has to solve not only the principal problems of the accumulation, conservation and careful distribution of soil moisture, but has to confront the complexity of the problems created by all the named important factors.

The work of the Dry-Farming Congress is a big one, and one of the most important peaceful works, and one of the far-reaching works of the greatest interest to my own country.

The time is not far away when the demand of food will be much greater than the production of all the irrigated lands, and all the watered lands of rainfall regions, and then the production to supply will come from the dry-farmed lands. That is the reason why dry-farming is so vital in itself, and will be vital eternally.

I am deeply sensible of the privilege to bring greetings to the Ninth International Dry-Farming Congress and best wishes for the future development of dry-farming.

I thank you.

MR. MANTLE:

The next country from which we will hear is the great island continent of Australia. It is represented tonight by its Trade Commissioner to the United States, Niel Nielsen. He is no stranger to the Congress, and needs no words of introduction. This Congress has heard from Mr. Nielsen before during these sessions, but we will be glad to hear again any message from Australia.

Australia

MR. NIELSEN:

Mr. Chairman, when I had the privilege of addressing a few words to you yesterday, I made a serious omission in so much as I forgot to convey to this Congress the greetings of the Irrigation Congress held in Calgary, and from whence I came. Before I left Calgary, Mr. Case, who is a Kansas man, and President of the Congress, asked me to convey to the members of your Congress the most kindly greetings from their Congress. I am very pleased indeed to have the privilege of conveying those greetings, although I failed to do so yesterday when I had the privilege of speaking.

I regard it as a special privilege to attend this Dry-Farming Congress. Two years ago I had the pleasure of attending the Congress held at Lethbridge, Canada, and I say what I honestly believe to be true, that I believe this Congress has the greatest collection of men with good information in regard to dry-farming that has ever gathered together in any part of the world. The addresses that I had the privilege of listening to from thoughtful men who have carefully studied their subjects, are worthy of any gathering of scientific men, and ordinary farmers can have the privilege and benefits of this enormous information which has been collected together of how to extract from the land a little more than has been done formerly. We of Australia are most vitally interested in the science of dry-farming. We do not frighten the farmers by this phrase, scientific farming, for the farmers of today to a very large extent, are scientific agriculturists. They know that what we are attempting to do by having these meetings such as we are having tonight, is to make them more scientific.

Owing to the keen competition which extends now through all classes of business, the farmer must run his business on up-to-date lines if he wants to stand in the forefront of business. He must put into that business all his energy, his muscular energy, and the whole of his brain energy; and I might call this Congress the brain center of the farming world. I believe in doing this, I am not conferring upon it a title that it does not fully deserve.

We have in Australia rather more than a fair share of dry land as compared with other parts of the world. Although we have the smallest of continents, we have 3 million square miles of land contained in that. Out of that we have a full third, over 1 million square miles, upon which the rainfall is less than 10 inches per year. Another third received between 10 and 20 inches, leaving only one-third on which there is a rainfall of more than 20 inches.

I was in the state of New South Wales one very rainy day. I met a

man on the street and I asked him how much rain they had there. "Why, last year we had three yards and a half," he replied. "Well, how much is that?" "Ten feet six," he said. Seeing I did not yet comprehend, he said, "That is 126 inches, if you want to get down to detail." I mention this simply to point out that we have excessive rainfall.

Practically the whole of the dairying wealth is raised in the tropical parts of the country. We grow good cows, send the butter to London, and get good prices for it, under latitude 17. I do not believe commercial butter, taking its chances in the world, is raised under such conditions. The whole of the dairying industry in tropical parts is carried on by the feeding of certain grasses secured from Peru. These grasses were brought to Australia by a German farmer about 25 years ago, absolutely revolutionizing the dairying industry to such an extent that large areas of land which were growing sugar cane were put into growing cows. There is more money made out of dairying than out of sugar cane. As far as this part of the country is concerned we do not need irrigation.

In regard to dry-farming in Australia, I want to say this; that as far back as 35 or 40 years ago, we started dry-farming in certain parts, not that we did not have any amount of land upon which we could farm, growing all the wheat in the rainfall area, but that in five or six separate places in South Australia the farmers, when they started to grow cereals, to keep the people in that state which was not then connected by railroad with other states, they had to get enough to keep the people of their own states, and to provide enough for the people to go out on the dry districts of that state. The result was that these farmers devised a system of dry-farming which I have found since being practiced in America, and is identically the same as is used here. I am pleased to be able to say that these men without any knowledge of what was going on in the United States and Canada, were able to invent something to bring about a system of dry-farming which is practically the same as existing here today.

My own farm has a rainfall of 30 inches per year. Although I say it myself, I have always been rather progressive in regard to farming, and I adopted this dry-farming system, although we had sufficient rainfall, and by so doing, I was able to produce more than any other individual in that locality; but the result of it was that I am being sent to help the farmers of that country to improve their land by dry-farming methods. I point these facts out to show that we have been trying to work out the same plan there as here. I appreciate very fully the enormous good work you are doing here. The farmers have only come to their own during the last few years. The wheat farmers were forced further west on account of the dairying industry. Practically all of the wheat grown in Australia, which only runs in the neighborhood of 100 million bushels, is produced in what we call the dry belt, or where the rainfall is less than 20 inches. The reason we do not produce more wheat is that we have such tremendous producing power as compared to our consuming power, that we are compelled to produce the things which we can most easily sell, and wheat is not one of them. Our wheat has to be shipped about 13,000 miles, and you can quite

easily realize that the carriage of this stuff over 13,000 miles of sea will add a tremendous value to that or from the farmer. After careful calculation I have found out that from the difference between the London prices and the farmer's prices, after giving the farmer all the assistance we can, notwithstanding the fact, he only gets four-fifths in cash of the amount of what his wheat sells for in London. If we produce butter, when that is sent to London we only lose 7 percent on the value of the butter. If we produce wool—last year 800 million pounds of wool was produced—sending it to London, we only lose about 6 percent of its value; and mutton beef, which is produced in enormous quantities, is sent to London, its only adds 12 percent to its value to send it there. Mutton production is a mere by-product of the mutton industry, as it is of so little value to us in Australia. That, however, is a very good thing for the consumer.

I can go into any retail butcher shop in Sydney and buy a quarter of mutton for 50 cents or less. It is a matter of absolute impossibility to sell all the sheep and cattle in Australia, although the quantities are sent away. The result is that we have every year a large number of livestock getting old, so that in order to make use of them, we boil them down into tallow, and send the tallow to London. I only point out these facts to show how disabled we are on account of marketing. I realize, however, that when you people farm your land so closely that you cannot produce enough beef for your use, we can sell you some.

In regard to dry-farming, it is practically the same in Australia as in the United States and Canada; the only difference being that every dry-farmer keeps stock as well as farms. He keeps a certain number of sheep and other livestock, so that he hasn't all the eggs in one basket. The Government has assisted the farmer to this extent. It estimates how much a farmer should have, say 300 acres of wheat on a 16-inch rainfall. He is not limited, however, to 300 acres, but given 900 acres he follows the plan of rotation of crops—wheat on one-third of the land one year, sheep next year and fallow the next year. That rotation we have found in Australia is the best from every point of view. This rotation would possibly not be so valuable to you here in this country, as you could grow other crops more valuable than sheep. The government recognizes this fact by giving the dry-farmer three times as much land as is considered necessary to live on.

We have a different way of taking off our wheat crops in Australia. We use almost exclusively the stripper harvester. Instead of the reel and cutter on the ordinary binder, this harvester has a hood which is placed over the wheat. In this hood are a set of fans and a cylinder. The cylinder beats the grain out of the heads of wheat and the fans cause a suction which carries the wheat on to another part of the machine, where it is thoroughly cleaned or threshed. This leaves practically everything on the field. The result of this method of taking off the grain has been that it puts the wheat on the market quickly after harvest and we can get better prices in London. Another valuable feature of using this plan is that it has practically done away with farm labor at harvest time. I have a friend who farms 400 acres each year, using two stripper harvesters to take off

his wheat, and with the assistance of one boy takes care of his crop. These stripper harvesters take six horses to draw them. They usually use one set up until noon, and put on fresh horses for the afternoon. This method of taking care of our wheat crop is an important one to us. I do not know whether this machine would suit your conditions here, because to suit this machine we made the machine to suit our conditions down there, and we had to get a wheat that would not shed the grain and yet would beat out quite easily.

We have been growing grain to suit the different parts of the grain-growing areas for the past 25 or 30 years, so that when a farmer comes into the country, he goes to the Agricultural College to find out what kind of wheat can be grown in the locality in which he is farming, so no experimental work is necessary. The experimental farmers in Australia have done an enormous amount of good. In my state, we have thirteen experimental stations; in some of the other states almost as many. These are not only experimental stations as generally understood, but they are also demonstration farms which in that particular locality demonstrate to all the farmers living in that locality what may be produced in that particular locality to the best advantage.

I want to allude to how the government assists the farmers. All the railroads are owned by the state. The experience in Australia has proved that this is all right, although you do not think it practical in this country. We have a fixed rate beyond which the railroads cannot charge. Away back in 1901 we proved to the whole of the population of Australia how favorable it was for the people that the state owned the railroads. In 1901 we had the greatest drought that ever passed over Australia. Stock died in thousands and millions. My state alone that year lost 9 million head of sheep, but we saved all the breeding cattle and sheep because the government owned the railroads, as they took them all out for \$5 per carload, and brought feed to the weakened stock at \$5 per carload. By that method we saved 32 million sheep and 3 million cattle by this action of the railroads; and the result was that in two years we were back to where we were before the drought.

In regard to one other thing, the state owns the telephones and telegraph. I can send a message of 16 words for 24 cents from one end of the country to the other. I have a business office in Sydney, and I pay for my telephone service \$40 a year for 2,000 calls. In San Francisco I pay \$168 for 2,000 calls, and the state owns the telephones in Australia. The rates are so reasonable that you will find telephones in almost every farmer's house. Again, every farmer can send his children to a state school, for the state runs the schools. The general taxation keeps the whole school. Wherever there are twelve children in the district, the state will build a schoolhouse. That is how we bring education right to the door of everyone in Australia. These ideas have worked well for the people, especially for the farming community of the country.

MR. MANTLE:

I was very sorry indeed to have to remind Mr. Nielsen of the passage of time, as we were all very much interested in what he had to say, and I realize he had come a long way to make this speech.

All of us who try to keep in touch with world events, appreciate the enterprising progressiveness of the various state governments of Australia, and I think when we have men like Mr. Nielsen, a man who is a member of the government in South Wales, we will understand how so many progressive measures have been put on the statutes of the government.

We now have with us the representative of Greece to whom I referred earlier in the evening, and without any further introduction, I will call upon Hector M. E. Pasmezoglu, Grecian Consul-General at Saint Louis.

Greece**MR. PASMEZOGLU:**

I was put down on the program for tonight but other business for a time compelled me to be out of town, so I am unprepared; in fact I told your Secretary that I was out and not to put me on the program, but since I have arrived, here I am talking to you.

Greece, which I have the honor to represent, maintains itself mainly by agriculture. Most of the population are farmers. The southern part of Greece produces the best quality of currants of any part of the world. California produces them, but we can produce a better quality than the domestic currants. On the production of currants we rely principally for the greater part of our income. Besides that, we grow some tobacco and in the northern part of Greece, Sicily, we grow wheat. In the new territory that we have acquired we grow the best quality of Turkish tobacco known. This is planted about the month of May, and they do it out of sprouts that have been prepared in hotbeds. They are put in plantation about May, and about June they reach up about 1½ feet, making about 14 or 16 leaves, and when the leaves get about yellow, they are picked and are left in the sun until entirely dry. They are selected or graded several times.

Now, besides the two things I have told you of, there is the cheese industry, which is done in a very primitive way. It is made out of the goat's milk, and I find some Greeks in Colorado who have a herd of sheep of about 300, making cheese in the same primitive way as in the old country. Each shepherd will have 800 to 2,000 or 3,000 goats, and leases a mountain range. The goats are milked each day; and the milk is converted into cheese. The most peculiar thing that will interest you is that it is absolutely impossible for anyone to go into the village and procure a glass of milk. The milk is all made into cheese, no milk being shipped into the town. There are absolutely no facilities for shipping milk like they do here. I admit that Greece has to do something as far as milk is concerned.

As far as the government assisting the farmers, this is done very well. We have many experiment stations and give the farmers good financial aid. For about 80 years Greece was dependent, and most of the people are uneducated as our system of education has been in progress but about 25

years. We are doing all we can now by way of our experiment stations to educate these farmers to modern scientific methods, but anything new they look upon with doubt. But when the new generation comes up, we will be able to implant in them these new methods, and I think we will be able to introduce these methods and get as much out of them as you do now.

Greece made a great mistake several years ago in destroying her olive trees. Ten or fifteen years ago the French vineyards were destroyed, and there was an enormous demand for grape wine, and the farmers made the great mistake of destroying the olive trees and put in vines, so when the disease which destroyed the vines was wiped out, the farmers had too much on hand. There was a company formed that would buy all the products of the farmer, and he could make on it the fixed price, and what was left on his hands was either kept for the year or made into alcohol. The best alcohol is made out of the currants.

We have avoided the financial ruin of our farmers in this way. What I want to impress on you right now, being before such a crowd of representative Americans, is the fact that Greece today is in a very civilized condition. Being here with Americans for about ten years, many have asked me if Greece is semi-civilized. You will be surprised at the enormous progress we have made in the last 25 years.

Another question that is asked is whether the Grecian language is the same as formerly—whether the language of Homer is the language used today. The language of Homer is the very same language as the civilized Greeks talk today; but language always changes with civilization. I have also been asked if the Greeks of today are the same race as of old. They are of the same race, but are not as good looking as formerly. But then I ask, are the Americans the same as formerly. I answer, no. Because the artists picked up the best! I find that intelligent people bring up such questions to me, and expect every Greek to be an Apollo.

About their education: We have the elementary education, or what you call the grammar school, and the Greeks are compelled to take their children and educate them. We also have colleges, universities as you have here. Another question that is often asked, is, "What is the condition of woman in Greece?" "Has she the same liberties as here?" I answer, "No." We had Greek women studying medicine before any women in America, also women lawyers. The women of the cities are today just as well educated and are considered on an equal with men. In fact, I think we have too much of it lately. If it was not for the respect of the community and the natural illfeeling that people have towards a woman divorcing, we would have just as many as here. But in Greece a woman will not divorce her husband. She will suffer almost everything but still stay by him. Woman is absolutely independent. She has one argument in using against her husband. "I will do as you do; whatever is good for you is good for me. If you go out in the night, I will go out in the night. If you go to the club and stay with your friends, I will go to my club and stay with my friends. If you smoke, I will smoke!" They follow this plan

to the letter, and if you women here practice that, you will find your husbands will be as meek as lambs.

MR. MANTLE:

We have heard from a good many quarters that there was a human element in dry-farming. It is very evident that this audience is interested in other subjects beside scientific agriculture. We will now call upon the representative of a neighboring state of Greece, Turkey. Greece and Turkey have not been the best of friends of late, that is speaking nationally, but we are here tonight as friends, and I introduce to you, Izzet B. Suryieh.

Turkey

MR. SURYIEH:

It is indeed a great pleasure as well as honor for me to address such a congregation on behalf of the leaders of agriculture of the Imperial Ottoman Empire.

Your heroic efforts at the redemption of the arid waste from its native sterility, and by better and more scientific husbandry, making it yield plenty where very little formerly grew, thus making homes and a civilization possible on what was formerly a desolate, inhospitable desert, has attracted to you the attention and admiration of people all over the world confronted by similar problems.

Even farmers located in the more favored humid sections shall come to look upon you not as the supporters of a mere fad or theory, but as the great teachers of the principles of conservation and of better and more scientific husbandry.

I am to talk to you this evening about the Turkish Empire. I regret to say that my experience among many of my American acquaintances has shown me that they are not too well acquainted with the geography of my country. There is, however, every reason why an intelligent audience like this should be very familiar with the Turkish Empire, which occupies countries that have been the seat of most wonderful civilizations, whether it be the Babylonian, Phoenician, Greek, Roman, Jew, Christian, or Mohammedan—every one of them has played either all or a part of its great role in the world's history on one part or other of the territory making up the Ottoman Empire.

The Ottoman Empire extends from Adrianople in Europe to the Southern coast of Arabia in Asia. It includes Asia Minor, Syria, Mesopotamia and Arabia. This territory represents a vast area of land extending from a northern latitude that passes by Constantinople in Turkey, Madrid in Spain and Springfield, Illinois, to a Southern latitude that runs through the Panama. Such a stretch of latitude gives the country a variety of climate that naturally correspondingly governs the kind of agriculture as well as produce of the different sections.

Asia Minor—This great peninsula is made up of a central plateau of an elevation varying from 3,000 to 5,000 feet above sea level. The central plateau is surrounded by ranges of mountains that exert marked influences in modifying its climate. The northern portion around Trebizond enjoys plentiful

rainfall that decreases as we proceed towards the heart of Asia-Minor. The western coasts enjoy good precipitation and the southwestern has both precipitation and sunshine that makes it a garden spot abounding with semi-tropical vegetation. The southern coast of the peninsula enjoys less rainfall and consequently is either subhumid or nearly arid.

The produce is made up principally of wheat, millet, opium and the following noted articles of commerce: The famous Smyrna figs, tobacco, and the valuable Mohair wool produced by the Angora goat. Grapes and olives are also produced in the southwestern section. The method of farming is primitive and although the soil is fertile it is far from being all cultivated. Asia-Minor presents a very promising field for humid and sub-humid farming and I believe the efforts of diligent farming will find a plentiful recompense.

Syria—Is a country connected with history that should be familiar to all Christian people; is a country that has similar climatic as well as agricultural conditions to your great commonwealth of California. The coastal plain of Syria has, lying to the east of it, two ranges of mountains that intercept the rain, shedding it along the coast. This plentiful rainfall combined with a sunny, warm climate, make it a garden spot where the citrus, fig, olive and vine flourish; truly a land as described of old, flowing with milk and honey. As we proceed inward, we meet subhumid conditions where wheat, barley and legumes are grown. Proceeding still further inland, we reach a grazing country which verges into the desert. With the exception of a few efforts here and there at modern farming, the majority of the farmers still adopt very primitive tools and methods, indeed almost identical with those of Biblical times.

Arabia—This is another great peninsula, the main part of which is a plateau. Most of it is a desert beyond any possibility of reclamation. Here and there the presence of water makes of the fertile sands of the desert a garden that stands in strong contrast with the surrounding aridity. Along the coast rainfall makes possible the growing of wheat, barley, dates, and the famous coffee. Quantities of gum are also exported from that country.

Mesopotamia—Once a country extensively cultivated by irrigation and with a wonderful fertility, that the famous Greek historian Heroditus refused to describe for fear of being considered as exaggerating the facts is now cultivated in certain portions to a very limited extent to grain, rice and dates. Another part of the country serves as grazing grounds. Mesopotamia presents a most promising field for the dryland farmer and especially the irrigation engineer. The millions of people that it can support, and the wealth and splendor of which it is capable, when its stream waters are applied to its rich and deep arid soils, will be a marvel to behold. Suffice it to say that it was once the country that gave the poetic prophets of old their picture of the garden of Eden.

This is but a brief survey which my limited time on the program has allowed me to give of the country which I have the honor to represent tonight.

In closing, I would like to express a word in appreciation of the kind

and courteous treatment which I have received during my stay among you. I assure you that I have found it most interesting as well as instructive. I would like to express on behalf of my fellow Ottomans a sincere appreciation of your kindness in inviting us to take part with you in learning better ways to the pursuits of peace and happiness.

We hope that your noble efforts may enjoy every measure of success and prosperity.

MR. MANTLE:

Now, we are making very good progress so far, and there is nothing I detest more than having to call time on one good speaker after another, and feel that you also are being deprived of exceedingly interesting and valuable information. I am sure that from what we have heard from the Turkish representative, we shall all wish our Turkish friend and those who are associated with him in getting the people of his country interested and giving them a knowledge of dry-land farming of this country God-speed in developing the agriculture of the Turkish Empire. Another privilege we have this evening is that of listening to the representative of the youngest portion of the British Empire, at least the youngest part to be organized politically, and that is the nation of British South Africa, and the nation is represented tonight by Mr. Frank E. Geldenhuyse.

British South Africa

MR. GELDENHUYSE:

I suspect you must be feeling by this time about as I felt on Monday morning when I came here and heard all the different states represented, and tonight when you are hearing all about the different countries on the globe, I expect you will say the same as the man who visited the menagerie to see all the different kinds of animals, that he realized now how many animals there were, but he could not realize where Adam got all the names for the animals.

After hearing so many facts, I feel like a big sponge—all the information seems to be running in one ear and out the other. I heard a couple of farmers talking the other day. One of them asked: "Do you suppose when we get back to the farm, that all the information we have heard will come back to us?" That is one consolation anyway.

The chairman has just said that we are the youngest British possession, and you possibly saw in the papers this morning that that particular possession had revolted, so I do not know how much longer it will be a British subject. I do not believe it is very serious, however. You all possibly remember the Boer war, and these are the men who are trying to suppress this revolution, and I assure you they have the bulk of sympathy on their side, and I feel they are right because whatever England might have done in taking South Africa, I think England has certainly treated us in the most manly way that any nation has treated any subordinate nation, and I think we owe England a duty. I would rather be under English control than under Germany.

Although South Africa was discovered about the same time as North

America, yet we feel that we are only the baby of the human race. It is only about 30 years that we have begun to develop, and I am sorry that someone who is more able than I could not speak for that place, for I feel only a baby myself when we all meet together at this congress. I am only a student and am here to learn. Perhaps after staying here I will be able to apply some of the things I have learned here.

Since the Boer war, there has been more progress in South Africa. At that time, as you will probably remember, the whole country was devastated—absolutely nothing left on the farms. But although they gave up their farms, when they got back to their farms, although they had given up their liberty, they had not given up their intention of becoming a great nation, and the government was behind them and helped them, and they began to till the soil again, and today our country is almost back to the same stage as it was just before the war began. I hope this little revolt which has just broken out will not break up the country again.

I think I have had the same experience as the speaker who just spoke. I met a man on the train the other day and when I told him I came from Johannesburg, he asked, "Where is Johannesburg? How big is it?" It is about six miles square. It is there the diamonds which attract the women folks so much are found. At least they like to have a \$150 diamond ring when they marry.

After all we have a great stretch of country there. I think that South Africa, which is made up of four colonies, is one-fifth or one-sixth of the area of the United States. At least it is about 1,000 miles one way and 500 miles the other direction. Now, what about the topography? Going up from the sea coast about 100 miles, you rise several thousand feet above sea level. Then we have big plateaus. The country rises abruptly, not like the mountainous portions of the United States.

As far as our soil is concerned, I believe we have about all the different soils you have in this country. Now, the plants. We grow about every kind of plant you can think of, or every variety of grain. There are some places where we can grow wheat; other places where we can grow corn. I did not realize you were so great that there was no chance of anyone else being greater, for I used to think that we had the greatest agricultural country in the world. We have barley, oats, and also, alfalfa. What will probably surprise you, is that we can grow just as well as you can here, all these products. We raise alfalfa under irrigation measures, and I do not think I have seen any better here than on our farms.

A certain part of the country is fruitful. We have a great wine industry near Capetown, and we pride ourselves on having just as good wine as France. All the subtropical fruits are raised. Near Johannesburg we raise apples, peaches, oranges, lemons, etc. Grasses are abundant, livestock also. In fact we can raise almost anything under the sun.

Of course, when people hear about Africa they think of the wildest country in the world. They think of wild animals, and think of going hunting, but when you get down to South Africa you do not find the animals any more. There are about five negroes to one white. As to livestock I just

mentioned, I think that next to Australia we are probably the biggest sheep country, and although we are much smaller than is the United States, we have about as many sheep as you have in this country. You can realize that it means quite a large number.

We are introducing better stock. One of the steamship companies going between London and Capetown is carrying stock free of charge, and a large number of farmers are getting a purer breed. I must say that the people there have not gone in for pure-bred stock as they have in this country, but as I say, we are young yet but are making fast progress. As to the business side, I will say that the government is giving all the aid it can to the country. Any farmer can get money from the bank at 3 percent, and I think that the only stipulation is that the farmer must pay it back in 30 years, which gives him plenty of time. Since the war, four agricultural colleges have made great progress. The government also sent away a large number of students to different countries. About sixteen students were sent shortly after the war to the United States and Australia. Most of these men are back now and are doing good work. We feel that the United States and Europe are our father and mother, but we hope some time to grow big just as you are growing big and bigger. What are our needs?

Our needs can be summed up very easily in three words that begin with I. The first, instruction; second, irrigation; third, immigration. A great deal is being done in the line of instruction in agricultural colleges. The schools have no agricultural teachers, and there is no development in that line. A good deal of the country is under irrigation, or dry-farming. The farmers must come to use the best methods of conserving the moisture in the best way. As to immigration, here we have this big stretch of country, almost one-fifth of the United States. You have 100 million population, and we have only 1 1-4 million white people, and about 8 million black, so you can see what a vast difference this makes. What we need there is more people. We want education, the best use of the land, and we want more people so we can develop our industries and our farms. Then, just as you did forty or fifty years ago, you looked to the west, so our people are looking to the north. I hope that we at least will be helpful in a little way in trying to develop our people. Don't just think merely of Africa; think of South Africa, the second largest continent in the world, and how very, very little of that country is developed. Why should it not be good for people who live there? What is the matter with the place? Why, you say, the big Sahara desert. All the provinces of South Africa can be cultivated if better methods are used.

We are trying to get what we can from you, and we hope you will give us what you can, and we hope that we in our generation will help to promote civilization as well as we can.

I thank you.

MR. MANTLE:

That was an interesting glimpse of the southern part of a great conti-

nent, and it was interesting also to know that the quickest and shortest way to disarm a foe is by generous treatment.

We have all heard that half the people live in China, another great dry-farming country, in which dry-farming has been practiced longer than in any other part of the world.

I will now ask the representative of China to tell us about that. China has been represented at practically every Congress, and intends to be represented in the future, and is very well represented at this Congress in the person of Dr. Koliang Yih, Secretary of the Chinese Legation at Washington, and a graduate of Cornell University.

China

DOCTOR KOLIANG YIH:

"East is east and west is west, and never will the two meet," said the great writer, Kipling.

But the east and the west will meet, and do meet, and do meet here today in a "dry" Congress, in the hospitable city of Wichita, in the dry state of Kansas, under the direction of Dr. Waters, an aquatic name! The time, the place, the man are in every respect ideal!

Dr. Hume said the other day that he represented three-fourths of the people in his state, because three-fourths of the people are engaged in agriculture.

I may say that I come here to represent nine-tenths of my people, because nine-tenths of my people are tillers of the soil.

I bring here the greetings of our Minister of Agriculture and Commerce to the world's delegates in general and to the people of the United States in particular.

Like many countries China is unable to bring her farm products from the dry region to be exhibited here on account of the transportation difficulties. But in spite of this our ministry has delegated me to be present.

We are an agricultural people, and we owe a great deal to agriculture. The popular government will respond to the call of the agricultural congresses in any form.

The agricultural problem in any country becomes more complicated when the country is thickly populated. In China we have a population three times that of Russia, four times that of the United States and almost ninety times those of Australia and Greece. The staple crops of our country are wheat and millet in the north, wheat and kafir in the northwest, and rice in the south. We will grow rice wherever water is procurable, and we can grow it farther north, for we believe it to be the best and the cheapest food.

Near the city of Peking in the same latitude as New York or Chicago, I have grown 1,200 pounds of milled rice from an acre of land in my experiment station.

Dry-farming comes only when irrigation fails. This especially is true in the north and the northwest. On account of the lack of proper care of the forests in the past, the agricultural condition of our northwest is deplorable. Heavy rains and great floods may happen, but as the lands are

deprived of forestation, a regulated flow of water is impossible. Consequently droughts very often follow heavy rains.

In the cultivation of wheat or some other small grains and in all other affairs of the agricultural life, the primitive ways of centuries past are still in vogue. The seeds are poor and the implements are crude. But in spite of these shortcomings the farmer in China cultivates intensively. He grows much product per unit of acre. He cannot afford to fallow the lands as you do here. To raise stock is unprofitable because his farm holdings are very small. Vegetables and poultry take place of dairy products and he can get along fairly well without resorting to the latter. Owing to the lack of facilities in transportation, many failures have resulted.

Our attention has recently been turned towards the west and northwest of China, because of the overpopulation in the east and southeast. We have land, we have labor, and we are going to support the dry-land farmers financially. It is known to everyone here that the principle of dry-farming means better cultivation, conservation of moisture, and the introduction and breeding of drought-resistant plants. In the matter of intelligent cultivation we have nothing to worry about the Chinese farmer. The aim of the Chinese ministry of agriculture is to establish as many experiment stations as possible. A national forest policy is to be inaugurated and a bureau of plant industry has been founded.

Personally, I will do my best in getting all the available data and material from this Exposition and Congress recommendations will be forwarded to our ministry to be acted upon, and I am pretty sure that in the next Congress China will be able to send over some dry-farmed products to the Exposition.

In conclusion, I would like to say that in time of war we must prepare for peace, for only in the time of peace can we enjoy prosperity. But in case of farming we have to prepare for the worst, and look for the best. Elements of uncertainty have to be considered. Dry-farming methods are also applicable to regions having better climatic conditions, for these methods are preparations for the worst. When this is done we will have permanent peace and plenty; we will have then,

"Little fields well tilled,
Little barns well filled,
Little wife well willed."

MR. MANTLE:

I was relieved that the Chinese delegate was able to conclude his remarks without an appeal for population. As the others have put in a bid for more population, I was afraid the Chinese would do the same!

It struck me that our friend had absolutely no chance whatever really to develop the theme of Chinese agriculture, and under these circumstances; but it also occurred to me that any of you who are at all interested in agriculture of other countries, would be interested in the book recently published by Dr. King. This book goes into the work of the Chinese in a way in

which the Chinese representative has had no opportunity of doing here to-night.

The last speaker we will hear tonight is the representative of the I believe, a year, studying the agricultural interests of his government. He has asked to be excused, possibly because he came to this country without the knowledge of English, and possibly he feels as we would feel if we were in Spain and were called upon to tell of the agricultural work over there. We shall, however, hear him briefly.

Spain

SENOR GREGORIO CRUZ VALERO:

With my poor English—worth only, I fear, to make you laugh—you will not blame me if I am timid in delivering a speech before such a select and distinguished gathering.

I will ask you to forgive me what cannot be called English, and remember that your Secretary is to blame for all this!

I would have been happy if I could outline to you briefly the essential principles of agriculture which will shortly place Spain as one of the foremost nations in that respect, and how rapidly, now, simple and old methods are changed to complex, difficult, and modern methods of agriculture. To do this, our very best men in Spain are engaged to bring success.

Our dry-farming principles are fairly different. We need more intensive cultivation—if this word “intensive” could be applied to the dry-farming system.

So convinced is our government that the success to the above depends in educating the masses to scientific principles of agriculture that it has introduced a course even in our military schools, so the soldiers may, in time of peace, handle all modern agricultural machinery, and in time of war defend the soil with arms.

So our soldiers, after they have finished the compulsory service in the army, return to the fields educated and practically trained in agricultural principles, and able to produce more and better crops.

We are now fighting, and trying rapidly to destroy the agricultural traditions which are so deeply ingrained in our people from their forefathers; and substitute instead of primitive ways, scientific ways.

The agriculture of the future will require an intellectual alertness, sustained interest, and business ability, which many of our countries do not now possess. It is no exaggeration to say that modern biology, for instance, is, in my opinion, the background of agriculture in influencing country life all over the world as profoundly as electricity has influenced industrial life; and therein lies the hope of agriculture of the future.

Our present civilization tends automatically to bring intelligence to the great cities. The most important conservation is not only moisture on the land, as is the motto of the International Dry-Farming Congress, but the conservation of human intelligence; and the most important indirect advantage of this new agriculture lies in the fact that points out the means of utilizing in everyday life the wonderful facts of nature, placed at our disposal by modern biology.

It is obvious that the improvement of our crop plants, and the efficient organization all over the world of the communities that grow them is rapidly passing beyond the power of any man, no matter how competent he may be. The scientific study of the fundamentals of crop improvement require the efficient cooperation of all the talented men, with different points of view, and different kinds of ability. This Congress, with some little modification in the program, can realize this purpose. Scientific agriculture has no frontier, and recognizes no difference in nationality. If we project ourselves into the future, we see the great problems of agriculture being attacked from different points of view.

It is my purpose in this short address to destroy, or rather change the opinion so prevalent here in these states, that all our efforts and ambitions in Spain tend toward bullfights and pretty faces!

I thank you.

MR. MANTLE:

We deeply regret the absence of Harold Hamel Smith of London, Editor of *Tropical Life*, who was to have spoken on "The Progress of Dry-Farming Methods in the Tropics." His excellent paper on this subject will be read by the Secretary, Mr. Faxon:

Address of Mr. Smith

THE PROGRESS OF DRY-FARMING IN THE TROPICS

Amidst the thunders of war, although I am ashamed to say, well out of its reach, I find myself towards the end of August, seated comfortably in my garden reading about the charge of the Turcos, the bravery of the Belgians, and the doings of the Germans, whilst I listen to children playing at soldiers, and a sleepy church-bell tolling for a funeral; thus it is that I start to write about "Dry-Farming Methods in the Tropics."

Barely a month ago I was writing my paper for the London Rubber Exhibition Congress, on "Manuring Rubber," in which I urged the advantages of inducing the roots of rubber trees in the tropics to go down, and not spread out laterally, first to insure the tree getting the benefit of the water deep down in the soil away out of reach of hot winds and drying atmosphere, and secondly, to give them a firmer grip on the soil so as to minimize the risk of their being blown down by high winds. Writing along these lines reminds me of Dr. Widsøe's book, where, on page 93 he tells us, "One of the chief attempts of the dry-farmer must be to see to it that the plants root deeply. This can be done only," he adds, "by preparing the right kind of seed-bed, and by having the soil in its lower depths well stored with moisture, so that the plants may be invited to descend. For that reason, an excess of moisture in the upper soil when the young plants are rooting is really an injury to them." To my mind this sentence should be written up large in the office or sanctum of every agriculturist, dry-farming or otherwise, whether in the tropics or elsewhere. Even with matured trees it is the same, and Mr. Kelway Bamber of Ceylon, a leader among scientists in tropical agriculture, when reading a paper before the Low-

Country Products Association of that island, with the Governor in the chair, told those present that when the tissues of the root of the cocoanut palm "were cut through, the cut surface dried and shriveled, and new roots sprang at right angles to the original ones, so that any temporary injury from ploughing or cutting circular trenches round the palm when applying manure, was soon remedied. The idea," he continued, "that the cutting of the roots by digging or ploughing was harmful, was, he thought, a mistaken one, though it should not be done at the beginning of the dry weather. By frequent disturbance of the surface soil the roots were driven downward, so that such palms were less affected by drought. In the Peradenirja experiments, ploughing the soil twice had a very marked effect on the old palms, and the younger ones also greatly benefited by stirring the soil monthly with disc harrows. At Maha Illuppalama (like Peradenirja, also in Ceylon), in the dry zone, the effect was even more marked, the growth of the palms being very fine owing to this cultivation by means of disc harrows.

All those interested in tropical agriculture carried on under dry-farming conditions where planters have to raise crops on a smaller average rainfall or water-supply than is generally considered necessary, will have followed the experiments that have been carried out in Ceylon for some-time past to reclaim and cultivate the Wannai, a semi-arid district in that island which is subject to malaria, and so can hardly be described as desert land. If you turn to the map you will find, I think, that the Wannai is bounded on the north by the Jaffna Lake, on the south by the Aruvi Aar and the North Central Province, on the east by the Trincomalee district, and on the west by the district of Mannar. This area is said to run into some 1,860 miles. The land is not bare, but covered everywhere with thick forest or jungle; where it fails apparently, is in its water supply, there being no rivers except in the wet season, say October to January, and then the flow depends on the rainfall. What, therefore, will happen were this jungle or forest growth to be removed and crops (especially those other than trees) planted, further remains to be seen, as the absence of the forest may lessen the rainfall, and through that the water supply available, whilst, at the same time, the exposure of the soil to the air and wind must increase evaporation and further decrease the water supply in the soil, already an unsatisfactory quantity. For these reasons the attention being given to the reclamation and cultivation of the Wannai in Ceylon should be closely followed by every farmer and planter who has to adopt dry-farming methods on his own lands.

Another point against the utilization of this "apparently inhospitable region," quoting the Ceylon Observer, "may arise in a lack or shortage of subsoil water, and it has yet to be proved that tanks and irrigation schemes will have to be adopted rather than dry-farming methods, although they, no doubt, will come in very useful in a more or less modified form to send the moisture down and keep it there." What are, and what are not, dry-farming methods, strictly speaking, is not always certain, but if you use tank and irrigation water, and then harrow and mulch to keep that moisture in the

subsoil, I would still maintain these were dry-farming methods. And as it is with water-supply, so it is with manuring. When taking part in the discussion that followed the paper I read at the London Rubber Congress, already referred to at the beginning of these notes, Mr. R. W. Lyne, Director of Agriculture in Ceylon, called attention to my remark that a deficient rainfall discourages the use of manure, and then added, "This question goes into the province of the new doctrine of farming known as 'dry-farming'; now one of the points brought out by the Indian Dry-Farming specialists, is that manuring can, to a certain extent, take the place of moisture. The reason of this is, that you get a more concentrated food drawn up into the tree by applying the manure when the rainfall is deficient." Nitrate of soda certainly increases the moisture in the soil, by its very nature it would do so; and may I also point out, diverting from the subject for a moment, that, now our supplies of potash are cut off, the use of nitrate of soda has a double benefit on account of the great part that its soda content plays in freeing the potash in the soil and making it available for absorption by the growing crops. Anyone ignorant of this fact has only to study the literature issued by the English Board of Agriculture calling attention to it, whilst supplies of potash from the continent are lacking.

In Tunis the farmers are stated to be producing olives at a profit with a rainfall of only seven inches, as well as having the Sirocco winds to contend with. In spite of these drawbacks they have been so successful that the area under olives in this arid district is being steadily increased year by year, as can be seen in an interesting article on the subject published in "Dun's Review" for May, 1914. In some cases the olives are planted alone, (at times only ten to the acre,) but when interplanted with barley the results are just as satisfactory. Here are found trees (olives) said to be 70 years old, whose roots, it is claimed, cover a larger area than is overspread by the crown of the tree. This shows, therefore, that the roots extend laterally to a considerable degree. Tunis is said to be ahead of anything to be found in the United States even, as regards dust mulching to check evaporation, so maybe this helps the roots to keep moist; but to mulch properly you must keep your roots not only below the surface (and how often are they not projecting to trip you or your horse up as you pass along) but sufficiently down to let the harrow cut the surface up into the mulch.

So important a part do the roots play in semi-arid farming that in the San Bernardino desert in California, I understand, abandoned olive trees have lived and grown with an average rainfall of only three inches, but did so on account of the immense area covered by their roots which were found to extend over an area nine times the size of that overspread by the crown or top. All this tends to show how roots will extend in search of water and with all crops even in zones other than these semi-arid ones, I again say, send them down from the very start, first to find the moisture down in the subsoil, secondly to keep the roots and through them

the trees from harm, and thirdly to avoid as much as possible any chance of the trees being blown down.

Mr. O. W. Barrett of the Philippine agricultural department, but who has also had experience in the West Indies, in East Africa and elsewhere, is one among a number of men, who have been vigorously advocating the use of dust-mulches for some time past, and of course Dr. Widtsoe tells us all about the advantages, as well as the necessity, of using a loose, dry mulch to conserve the moisture, or rather to reduce evaporation, which is the same thing in the long run. In face of this it is important to note that in Tunis, we are told, by Dr. Russell Smith, in "Dun's Review," that in the course of time (it takes sixty or seventy years, it is true) the continuous dust mulch so exhausts the soil, that the olive starves to death, and almonds have to be planted to produce a new lot. Now is this correct, and if so, is it necessary? Is it the dust-mulching that kills these valuable trees, and if so, cannot their loss be avoided? Surely with but ten trees to the acre, even if their roots do cover an immense area, and manures must be applied at the ends or tips of the roots, it would be possible to put back little by little, during these 60 or 70 years, that amount of plant food that the trees and the crops require, if they are not to die through starvation. I mention this only to warn those who systematically use a dust mulch, just to watch their trees and see that no exhaustion is taking place, or if they see signs of trouble, to take steps at once to make up any plant-food found to be deficient, and if you cannot apply it in any other way, dissolve your fertilizer and apply it by pouring it into a hole or holes made round the trees; at any rate send it down to the subsoil. Green manures might also be introduced with advantage when possible, if dust-mulching is thought to be adversely affecting the trees.

You Americans, or rather, some of you, have been claiming certain advantages for the spading harrow as an implement with which to break up and pulverize the top soil when necessary to form a mulch, or for other reasons to help break up the soil in a manner similar to that done by a good frost in the colder climate; but is this implement really better than a good disc harrow with cut-away discs? Take, for instance, the English maker's Ransomes, Sims & Jefferies, of Ipswich, whom I mention because I know their machines. Would not their King disc harrow be better than the American spading harrow for forming a top dressing? It is a powerful implement and avoids, with its cut-away discs, any tendency of the soil to stick to the implement, as I should imagine might and would happen when using the spading harrow, especially on moist land.

Tropical planters owning land in a dry zone no doubt are following the excellent work being done in Ceylon, as at the experimental station at Maha Illupallama and Anuvadhapuva, with cocoanuts, sisal hemp, and Ceava rubber (M. Glaziovii) which seem likely to give satisfactory yields, though how near we non-scientific dry-planters can approach these Ceylon experts, remains to be seen. The cocoanuts especially were found to be getting on very well; cotton is also being experimented with, as well as certain native dry-zone timber-yielding trees. The wood of such trees should

be good, and certainly should not take so long to season and dry out as that grown on moister soil.

My old friend, the Mudaliyar Rajapakse, of Negombo, Ceylon, has been busy. Together with other Colombo capitalists, this progressive agriculturist has been buying about 2,000 acres or more of land in the Puttalam district of Ceylon, and hopes to secure another 3,000 acres where, by means of modern agricultural implements, and the help of dry-farming methods, he means to overcome local labor difficulties and cause the land, which is situated in the dry zone, to give a fair yield of cocoanuts, and, therefore, of copra to the acre. When I met Mr. Lyne at the International Congress in London, he very kindly promised to discuss the question of the Wannai and of dry-farming in Ceylon generally, with me, but unfortunately the outbreak of the war caused him to have to leave hurriedly in order to get back to his work in time, and so I missed a valuable lesson or two. I can, however, say that Mr. Lyne considers the increased cultivation of oil products may be expected to play a large part in the future tropical development generally, wherever conditions can be made suitable and that with the help of the experience gained elsewhere with dry-farming, the cultivation of oil-yielding palms, etc., may yet help to solve the problem of what to do with the dry-zone area in Ceylon; and if so there, why not elsewhere? The experiments, Mr. Lyne claims, that have been carried out at the Government station at Maha Illupallama already referred to, which is situated in the middle of Ceylon, illustrate decisively what can be achieved with cocoanuts in such a type of country by the application of some of the principles of dry-farming in conjunction with a little irrigation, and this not only with the coconut (*cocos nucifera*) but also with the oil-palm (*elaeis guineensis*.)

Lectures given by Mr. Ramasawmy Iyer, of the Agricultural College, on "Dry Cultivation" (in Southern India, I think it was in Tiruppur), have been followed, the Madras Mail tells us, with considerable interest and attention by a large gathering of ryots, to whom Mr. Iyer explained how they could make dry cultivation more paying by adopting better methods of tilling, and by the employment of improved methods of cultivation generally, and more especially by the use of improved ploughs. After the lectures there were, in some cases, ploughing demonstrations which were witnessed by a number of ryots.

I would like to mention one point here, and that is the advantage of using explosives when subsoiling is necessary to break up hardpan, especially when you do not want to disturb the surface. In the old days this could not be done, but today it can. Again, the removal of roots is necessary when ploughing has to be done and disc harrows used, and here again explosives can come in, coupled with a Hercules stump-puller, a Trehwella monkeywinch, or other of these useful appliances to remove the stumps after being blasted. Mr. A. W. Bevan, of Ceylon, writing in the "Tropical Agriculturist" for April (the organ of the Ceylon Agricultural Society), tells us that "Dry-farming will not be a wholly safe practice in agriculture until suitable leguminous crops are found and made part of the system. It is notable that over the whole of the dry-farm territory of this and other

countries, wild leguminous plants flourish. They do so in Ceylon where pila or tephrosia purpurea grows wild in the poor sandy soils of Jaffna, and other dry regions, and are taken from thence in cartloads to manure tobacco and other crops. Crotalaris also grow wild on sandy soils everywhere. "Thus," he continues, "there are these leguminous crops which not only yield wholesome and nourishing food (referring to soya-beans, ground-nuts, etc.), but enrich the soil with nitrogen."

Going back to the olive trees in Tunis dying of starvation, the above more fully convinces me that their loss is often avoidable. Mr. Bevan claims that an "advantage of dry-farming is that the soil does not require to be manured to the same extent as an irrigated farm. The constant stirring and aeration of the soil renders soluble the mud of the insoluble elements of fertility in the soil." On the other hand, the same authority goes on to say that the "older dry-farms in Utah, which are among the oldest of the country out there, have never been manured, yet are yielding better crops today than they did a generation ago." This is not the case with irrigated lands, but it makes one wonder whether it was necessary for the Tunisian olive tree to die, or if cultivation alone could have saved them, if the roots allowed. If it was the dry mulching that by exhausting the soil brought about their death, cannot some other means be **introduced to conserve** the moisture without exhausting the soil; or can the trees be manured underground in holes as suggested?

And so the tale goes on, but I must stop, although not half through my notes. I did not mean to be so long and apologize for taking up so much time.

I will conclude by saying that in March last, a little over two candies (=1120 lbs., or ½ ton) of crops produced from cocoanut palms cultivated in the dry zone, viz. at our old friend Maha Illupallama, were sold in Ceylon at excellent prices at the time, viz. Rs 84. (R= 1s. 4d, or 32 cents) a candy, being the highest price realized at that sale, the next best being Rs 83.50, or 16 cents American, less.

The foregoing and other facts that have come to hand from time to time, go to prove that the tropical planter owning land in a dry-zone district would be wise to pay as much attention to dry-farming, its methods and advantages, as you go-ahead folks in America and Canada have done for years past. Wheat, which is needed so much at present; maize, rice (in places), and other cereal crops could be grown, I feel sure, with success and profit, if planted by means of drills and perhaps a small application of some fertilizer at the same time (to nourish the seed and perhaps act as an insecticide as well), between rows of green manure that could be turned in, or spread over the ground as a mulch after the cereal crop had been removed. Meanwhile if soya or ground nuts can be made to yield, a crop from them may in some favorable cases be gathered as well, but in such a case always sacrifice your green manure for the sake of the cereal, i. e. the main crop, if necessary.

SECRETARY FAXON:

Tomorrow the Congress, and Exposition as well, has the good fortune to be visited by a considerable number of the railroad officials, representatives of half a dozen railroads, some of them roads entering Wichita, some not, and with a few presidents, a great many departmental heads, from there on down to the more humble official. It really will be quite significant, and it shows their interest in both the Congress and Exposition. They will be here tomorrow in official capacity and as visitors. I feel sure the Congress will be glad to have them here.

MR. NIELSON:

I wish to express the appreciation of the treatment received by all members of the international delegation.

MR. MANTLE:

The Congress now is at recess.

THURSDAY, OCTOBER 15, 1914**MORNING SESSION****Dairying****SECRETARY FAXON:**

The Congress will be in order on this concluding morning. After the very strenuous session of three days it is not surprising that the members are arriving a little late.

This morning is devoted to the subject of Dairying and Silos, and the session and speakers will prove of considerable interest to all of you here. I am sorry that we are late and that we haven't a larger crowd in the hall.

At this time I want to introduce as Chairman for the morning session, a former Kansan, a former Government man, and a former Director of Experiment Stations, and a man who has a considerable reputation in the dairying world—Mr. E. H. Webster, Fort Atkinson, Wisconsin, editor of Hoard's Dairyman.

MR. WEBSTER:

The man who doesn't care for dairying, I guess, has gone home. We take it that those of you who are here are interested in the subject of dairying. It is a very good thing for the dairy industry that everyone is not interested in it, and everyone cannot be, because everyone does not like that kind of work. We are not trying to make everyone into a dairyman, but we are trying to make everyone who is interested a good dairyman.

The dairy industry is a great industry. When we take it in connection with agriculture, it means an immense volume of business for the farmer and the manufacturer. This business is one that requires not only a liking for the business but a certain amount of brain and skill in order to handle it and make it a success. The man who has never handled dairy cows and

finds himself, all at once, in possession of a dairy herd is more than apt to go wrong in his work until he learns how to handle those cows. He must learn what kind of feed they should have, and how to get that feed before the cows in such shape that they can make the most of it; he must learn what his soil will produce; he must know something about breeding the animals; he must know something about marketing the dairy products in order to get the most from the products he has to sell. All these things are matters that take study; they are things that must be studied on the farm; they are things that can be learned by the man who likes the dairy business, but for the man who has no love for the dairy business, there is very little he will learn; and that little he will learn from books.

Here in Kansas—in Oklahoma—in all this great Western country, we have many men who are milking cows. Some of these men are making a fair profit from their business. Many are finding it profitable because on their farms, they all have stock that before they began milking, were simply raising them calves each year, and by milking these cows they have been able to market an additional product; and it enables them to make much more. Strictly speaking, these men are not necessarily dairymen. They are taking advantage of an opportunity that comes their way, and possibly there are men all over these Western prairies who could well afford to take that advantage of a situation which has been before them and to get the income that may be derived by milking such cows as they have on their farms. Just as soon as these men begin to study their problems as a dairyman, they are going to find it necessary, in order to make a profit, to get better stock than they have on their farm, and if they are not interested enough in the dairy game to make the study—if they are not interested enough to increase those profits, we do not class such farmers as dairymen. The man who is interested whether he has much capital or not; who has a keen interest in the dairy cow; who likes that kind of farming, has opportunities before him for improvement, for profit, for a line of work that will be something of which he can be proud, such as very few other lines of farming offer.

The difference between those extremes is so wide and the possibilities are so many that it offers a very inviting field to the man who loves that kind of work and who sees the opportunity he has for improvement ahead of him. The question so far as it applies to the dry-farm is, first, one of the permanent food supply for the dairy herd. That has been discussed in this conference by many speakers. This question of a permanent, suitable food supply is above all other issues so far as livestock farming is concerned. Without that, he will not be able to make it a permanent success, because, when dry years come and cattle have to be sold, the work of breeding and selecting are thrown away and we have to begin all over. But we know now what may be done on these Western plains with the silo, and the forage crops that we get from our sorghums are furnishing a permanent food supply. There need be no more sacrifice of stock such as we have seen because those years will come when the feed does not grow sufficient to carry the stock through the winter.

The dairy business means a long-time proposition. The man who is feeding cattle can buy a few carloads, put them in a feedlot for a short time, and then sell them. The man who is going to milk cows, if he is going to develop a dairy herd, has years ahead of him if he succeeds. If the cow is a good animal, he breeds her to a good sire and raises all her heifer calves. So it takes a long time to build up a good dairy herd. When we have to dispose of these cows on account of lack of feed, we lose all this work. A permanent food supply is assured all over this Western country if we will take the means of assuring it.

The dairyman must be somewhat of a businessman. He has to learn to buy and sell stock properly, and how to sell his product to advantage. Today and in the last few years, the men who are interested in dairying, all over this Western country, have been going into the East, particularly into Wisconsin, and buying dairying cattle by the trainloads and shipping them to the Western farms. Many of these men are buying to advantage because they know something of the dairy business. Many of them do not know, so they send someone who does; but I have known many of them to have been disappointed because they did not know what to buy. The man who has not handled this kind of stock knows nothing of what to look for, nor the kind of a dairy cow to buy. He goes East and he buys not from the dairy standpoint, because he does not know what the standard is; and in the East we have men who will take advantage of the ignorance of buyers and sell them stock they ought not to have. Much poor stock has gone into the Western country because the men who bought did not know what they were buying. There is plenty of good stock to be had, and the man who is going to buy, if he does not know himself, ought to depend on someone in his community or state who can guide him. You have farmers here in Kansas who have sent Professor Reed into Wisconsin to buy cattle for them. I think they were wise, because Professor Reed is one of the best judges of dairy stock in the country.

The question of buying and distributing these cattle is a business proposition and it must be learned. The dairy game is a business, which one must have a liking for—must have some knowledge of the details which make it, and it is a proposition into which we cannot go blindly and succeed. We do not expect everyone in this country to become a dairyman, but only those who like it, and those who do like the dairy business have a passing opportunity before them for improvement such as I believe is not exceeded by any other branch of the livestock industry today.

I am first going to introduce Mr. T. A. Borman, editor of "Kansas Farmer," Topeka, Kansas, who will speak to us on some phase of this proposition.

Mr. Borman did not get up in time to give me the title of his speech so I cannot tell you what he is going to speak on. Mr. Borman.

Address of Mr. Borman

DAIRYING.

What I say regarding the dairy cow is from the standpoint of the

small general farmer and applies in principle to the farmer in the corn belt as well as to the farmer of the Plains. I am not on this occasion discussing specialized dairying. The man who has an eighty or a quarter-section of land—the man who needs money each week throughout the year—the man who cannot, without incurring debt, wait for the twice-a-year marketing of hogs or the once-a-year marketing of grain or cattle—is the man who most needs to milk a few cows. These are the men to whom I would point the advantages of cow-milking, and from whose viewpoint I will discuss the essential fundamentals for profitable milking and feeding of cows.

Farm dairying for the rank and file of farmers everywhere, should be considered from the standpoint of its relation to good farm organization. The most profitable farm organization is a matter of so correlating the several almost inseparable farm industries that the land will be used for those purposes to which it is best adapted, keeping in mind the help available, the profitable utilization of labor throughout the year and the financial demands of the owner. Well balanced farm organization is the one outstanding essential to the improvement of farm conditions. I view farm dairying from the standpoint of its being an important factor in the execution of farm plans which will provide insurance against the unprofitableness of the so-called lean years, and such as will result in a greater profit to the best of the good years, and a weekly succession of cash income every year.

Milking a few good cows should be considered primarily and upon introduction into the general farm scheme, from the standpoint of supplying the necessary available capital for the conduct of the farm and for the living expenses of the family. If you will observe, you will find that the man who has been giving fairly good care to a few good cows, feeding them with reasonable intelligence, for a period of ten or twelve years as an adjunct to good general farming, is the man who is not worrying about the source of cash for his immediate needs and who will suffer least, and will not be put out of business by the unavoidable occasional short crop year. There is a preponderance of evidence showing how milking cows improves the farmer's financial condition—and let me say that this is true almost regardless of the kind of cow milked or the actual percent of profit in dairying.

In the beginning, it is not a question of whether the cow is of dairy breeding or a "scrub"—using the term "scrub" in contradistinction to the cow which carries dairy blood and so has been bred for milk production. It is the sale of milk or cream three or four times a week and the cash in hand with which to buy the groceries, the wearing apparel, the nails, bolts and hinges, to pay for the plow sharpening, the harness and wagon repairs, that makes the milking of cows worth the while to the small general farmer, and without regard as to whether the income from the cream or milk sold returns a reasonable profit in excess of the feed consumed and the labor involved. It is the prompt cash payment of the farmer's bills and the consequent absence of accumulating bills, that makes

milking cows so important a farm factor. The money derived through the sale of dairy products comes from the farm roughage, much of which has no cash value except through the cows, and which the cow must have, even though she be not milked. It is the \$35 or \$40 a month cash income from the dairy, that will permit the money from the sale of hogs, calves and grain to be applied in a lump sum where it will do the most good—either on the mortgage, the erection of a barn or dwelling, or in the purchase of more land.

The milking of cows providing the necessary cash income to take care of the daily needs, is the starting point for the man who would increase his herd. It must be kept in mind that milking cows does not preclude the fattening of the usual number of hogs or the growing of the usual acreage of other crops. The milking is only an added chore—and permit me to remind you that the chores of the farm are what make the most money. If you will make a canvass of your neighbors and find those who have the most hog, calf, horse, mule and poultry choring to do, you will have found the men who are making the most money and getting along the best. One hour spent night and morning in milking, during the crop-growing season, will pay better than the same hour spent in the field—except, possibly, during the harvest season. The crop-growing season is comparatively short, and it is during that time between harvesting in the fall and planting in the spring that we need the chores most, and it is during that time that dairying, with all the other chores that go with it, can be followed to the best advantage.

Livestock-farming gives from 12 to 48 percent larger income per acre than grain-farming—the higher percentage existing in localities where the most cows are milked. The feed for cows and calves grows when grain fails. The grain crop will make an abundance of good cow and calf feed when it absolutely fails to make market grain. To keep cows and calves as a sure and profitable market for the crops produced by the summer's labor, is a justifiable excuse for keeping and depending upon cows and calves for a market for this roughage and which roughage, in fact, is a byproduct of the grainfield. I do not deem essential argument purporting to show the greater profit at which grain can be fed to milk cows and young cattle as compared with selling it at the elevator. It is sufficient to state that probably 75 percent of the total grain marketed is bought by someone who feeds it at a profit to a steer, cow, or hog which he probably also bought, and to the cost of both he added freight and the profit of a middleman or two. Tell me, if you please, who can feed cows or calves or steers or pigs at a greater profit than the man who grows both the feed and the animal.

There is a wide range in the value of individual cows for milk production. In nearly every farm herd there are cows which are superior producing animals and in fact good dairy cows. I refer especially to herds made up of our common red and white farm cattle and which may be considered for the most part of Shorthorn foundation. Such class are found on most farms of today. These, as a matter of fact, are about half way between the best and poorest of beef animals, but the best milkers of these herds

are such as furnish a good foundation for building up a good milking herd, and the calves of which when well fed and reared, will give a beef return as good or better than is now obtained from the same herds.

While preparing these notes, I chanced to have handy the records of four western Kansas herds. These are such cows as I have above described. It is certain that they are very common cows. The four herds total 43 cows. The 1911 cash income from the sale of butterfat alone, for the average of the four herds, was \$42.50 per cow. In the best herd of the four there were ten cows, and from these was sold \$609 worth of butterfat, or almost \$61 per cow per year. In an investigation ten years ago in one county in Kansas, among the herds which were supplying cream to a cream-receiving station, it was found the best five herds of common cows yielded \$45 per cow per year; the average of 82 herds was \$33 per cow per year. The last three or four years butterfat has been worth fully 25 percent more than at the time of the census, and at such increased price would have made the best five herds average \$57, and the average of the 82 herds, \$40. The conditions under which these herds were milked were no different than those existing on the average farm on which dairying is not a specialty but a side issue, and gives a good idea of the income to be expected from common cows.

Last spring I inquired into the income from herds of dairy breeding in several parts of Kansas. One herd of registered Jerseys yielded \$85 worth of butterfat per cow per year. A grade Holstein herd gave an annual income of \$77; a grade Jersey herd, \$60.25, and another grade Holstein herd, \$75 per cow for the year. A herd of Shorthorns bred and selected for milk for several years, yielded an annual income of \$50 per cow. No so-called fancy dairying was employed in these herds. They received only good farm care. These figures will give the farmer who contemplates the milking of cows an idea of the cash income possibilities from each of the two kinds of herds. It must be kept in mind, however, that the money-making possibilities of a herd of milk cows cannot be definitely stated. The income and actual profit will depend upon the kind of cows, the care exercised in selection, the feed given, and the care taken. This indicates one of the essential advantages connected with dairying; namely, that with little effort or superior judgment it is possible to improve a herd and increase the income year after year. This improvement can be made just as certain as one day follows another.

It is to be kept in mind that in addition to the above income from the sale of butterfat, there was a calf from each cow each year, and skim milk for pigs and chickens. The cows would or should have been kept, even though they were not milked, for the calf alone. So the income from the sale of butterfat was readily available cash which proved the salvation of the man doing the milking.

I am a firm believer in the use of dairy blood in the farm dairy herd. The larger the annual product per cow, the more profitable that cow will prove to her feeder and milker. I realize that it is a long step from common cows to pure-bred dairy cows, and believe that for the small general

farmer the best plan is that of beginning with milking his common cows and gradually working into a herd of high grades and dairy breeding.

Almost without regard to the character of the cow milked, proper feeding or the feeding of roughage and grains containing in proper proportions the elements of feed needed in the production of milk, will increase the flow of milk, and so increase the profitableness of the dairy. Milk can come from feed only, and from a surplus of feed over and above that required for the maintenance and the support of the animal body. It has been demonstrated time and again that the average cow of the average farm dairy will increase her production nearly 100 percent by supplying her with ample feed of the required quality. For instance, the produce of a herd of 60 cows was in one year brought up to 251 pounds of butterfat as compared with the average of 123 pounds, which latter was the average product per cow of the 82 creamery patrons first mentioned here.

The fact is that the cows we are milking are not so poor as our feeding methods. We fill the cow's stomach with waste roughage, low in the constituents which make milk, and we think the cow is not worth milking. An abundant milk flow can be produced only by a certain combination of the nutrients of feed. For instance, milk is 80 per cent water. If the cow gets only half the amount of water she needs, her milk flow will be reduced one-half. Milk is about 12 percent casein or cheese, and only one constituent of feed will make cheese. If the cow gets only one-half as much of that constituent or feed as she needs or can use, the milk flow will be reduced to the point of her ability to produce casein. This fact is stated in a homely way; however, the illustration is that first principle in feeding cows for milk and must be indelibly stamped on the mind of every feeder.

The next point is that of liberal feeding. It requires something like 70 percent of all the feed the cow ordinarily eats to support her body and manufacture the milk she produces. The dairyman is shortsighted who would withhold any part of the remaining 30 percent of the feed the cow could eat if it were placed before her. The wise feeder will learn the capacity of his cows that they may receive and consume the largest possible profitable allowance. The cow in full flow of milk is expending as much energy as a horse at hard labor, and she works more incessantly than does the farm horse. It is of common knowledge that the harder the horse works the more feed he requires. We must learn the same lesson in the case of the cow. The more milk she will give or is capable of giving, the more feed she should be given.

Two essential constituents of feed necessary to the proper feeding of the milk cow, are protein and carbohydrates. In our commonly-grown farm feeds, protein is lacking. Our common feeds are rich in carbohydrates, so regarding the supply of this latter element we need not worry. It is so plentiful that we may waste it if we will, but protein is scarce—it is the expensive constituent of feed. Its existence in liberal quantities in alfalfa is what makes alfalfa hay more valuable per ton than cane hay, and is the reason why wheat bran sells for more money per ton than cottonseed hulls.

Of our farm grown roughages, digestible protein exists in largest

quantities in alfalfa hay, red clover hay, sweet clover hay, cowpea hay, soybean hay and Spanish peanut hay. Protein is needed, not only for the cheese or milk, but in making the lean meat, the muscle, bone, hide, hair, etc. It will be noted that protein is an essential element in the growth and development of all young animals. That class of grain feeds highest in digestible protein, is best exemplified by cowpea or soybean meal in so far as the products of the farm are concerned. In the case of purchasable feeds they are best exemplified by linseed meal, cottonseed meal and wheat bran.

The other essential of feeds is that known as carbohydrates, which supply the fat of the body and the heat necessary to keep the body warm. This class of feed is exemplified by our corn fodder, cane, kafir, milo, and feterita fodder, timothy and prairie hay, wheat straw, and such class of feeds. The grain rich in carbohydrates and corresponding with the last named roughages; are corn chop, corn and cob meal, kafir, milo, feterita meal, etc.

The roughages rich in carbohydrates carry sufficient protein to keep life in the animal body, but they do not permit growth or the production of milk. The roughages rich in protein carry carbohydrates in considerable quantities. Protein and carbohydrates are in these combined in proportions which permit of growth in the young animal and milk in the cow. This is the reason farm animals "do better," as we say, on alfalfa hay than on cane fodder—when each is fed alone. If carbohydrates alone, were fed, the animal would soon die. If protein alone were fed, the animal would finally die.

Of the roughages rich in carbohydrates as above named, it is absolutely impossible for the cow to consume a sufficient quantity to obtain the protein necessary for the production of milk in liberal quantities, or in most instances even to the capacity of the cow. Consequently it becomes necessary to supply the cow with a portion of her ration either in the form of hays rich in protein belonging to the first class named, or through grains or concentrates rich in protein. For instance, if the only roughage on the farm is corn fodder or cane or kafir fodder, it would be necessary to supply the protein either through cowpea or soybean meal, which can be produced on the farm, or through linseed or cottonseed meal which, of the purchasable feeds, will supply the needed protein at less cost than any other we might mention.

If, on the other hand, the principal roughage can be alfalfa hay, red clover hay, cowpea or soybean hay, then the ration can be completed with a grain feed of ground corn, corn and cob meal, kafir, or milo meal, or any other meals of the common farm grown crops. For instance, if the roughage is red clover or alfalfa hay of such quantity as the cow can consume, a ration of ground corn, corn and cob meal, kafir or milo, will supply the necessary nutrients for a good milk flow.

An element of feeding which must be taken into consideration is that of palatability and succulence. The animal will thrive and the cow will give milk only when the ration is palatable. A ration may be properly balanced

from a theoretical standpoint and still be extremely inefficient and expensive in the production of either milk or animal growth. On the other hand, a palatable ration not properly balanced theoretically will give superior results as compared with an unappetizing and unpalatable ration. Succulence is essential to the best results from any feed. Succulence is usually the forerunner and the assurance of a palatable ration. Of the hays, alfalfa is the most succulent.

Silage of corn, kafir, or cane is the best example of a palatable and succulent feed. Since the establishing of kafir and cane silage as a roughage—approximating if not the superior of corn silage—the feeding problem of the Western farmer has come near a full solution both from the standpoint of supplying the milk cow with an economical as well as an efficient ration. The silage of these three crops, however, is a feed rich in carbohydrates and must be balanced with the protein hays above mentioned, and if these are not available the protein must come through the feeding of either cowpea or soybean meal grown on the farm, or through linseed or cottonseed meal purchased. The silage of corn, kafir, or cane can be greatly improved by the silaging of cowpeas grown with the corn, cane, or kafir. This combination is becoming popular. It adds protein to the silage and comes near producing a balanced ration when cowpeas are added in sufficient quantities.

It is certain that in profitable feeding of milk cows as well as in the economical and profitable rearing of young animals, the proper proportion of the protein of feed is essential. On those farms on which corn, kafir and cane are grown, whether silaged or fed dry in the form of fodder, there must be grown the feed opposite in character which will supply the protein necessary for the proper production of animal growth as well as milk.

The feeding problem could scarcely be reduced to more simple terms for the farmer in regions of light rainfall. The dry weather and the drought-resistant crops are admirably adapted to a palatable, succulent, economical and profitable ration. The silo is an important essential—through it succulency and palatability will come, and above all a means of storing and holding feed from one year to another in a condition equal in feeding value and palatability to the green plant. Every man knows the effect of an armful of green corn fed night and morning to the milk cow. The silo makes it possible to feed the crop in just that condition in the dead of winter. Keep in mind that your cow produces the most milk in the month of June on good grass; that if you would have her do as well in December you should first make her comfortable by stabling, feed the same constituents offered in about the same proportions as are found in pasture grass, viz: 2.5 pounds of digestible protein to 12.5 pounds of digestible carbohydrates—and the profits of the cow will be limited only to your ability in selecting a cow that will convert these elements of feed into milk.

MR. WEBSTER:

Mr. Borman mentioned this subject of farm credit, which has been discussed more or less from this platform, and I just want to say this as to

what the dairy cow means to a community so far as farm credit is concerned: We have over 45,000 cows in the county in which I live. The farmers there, most of them, own their automobiles, and have good homes, and are good farmers, and have money in the bank, and they are not worrying much about farm credit, and they look at it with some amusement because they have the dairy cow.

DOCTOR WORST:

There is just one thought that I think worthy of presentation here and it is in full harmony with Mr. Borman, and I want to throw it out.

I have been making some figures and I take it for granted that a fairly good cow will produce in a year, cream that would sell for \$80; that the skim milk to the calf should be worth \$20; that the government says the manure is worth \$19. That would make \$119 income a year from one cow. You should endeavor not only to live comfortably while you are young, but also to have enough property accumulated to maintain yourself and wife during declining age, and when you have done that you have answered the purpose for which you were placed here.

If you will start your boy out at the age of 21 and teach him something of the principles of dairying and set aside the gross income of just one cow and if he has the business sagacity to keep the gross income of that cow until he is 71 years—at the end of 50 years that one cow will place to his credit \$30,000. I ask you whether it is not worth while to engage in the dairy business and to keep this one thing in view and make preparation for the declining years of life? Can you do it better, and is there any business that offers such a splendid opportunity? One cow will place to a man's credit \$30,000, and if she is an extraordinary cow, she will place to his credit \$60,000, for the calves will make the difference.

MR. WEBSTER:

We will now hear from O. E. Reed, Professor of Dairy Husbandry, the Kansas Agricultural College, and the work he is doing in connection therewith. Professor Reed.

Address of Professor Reed

SORGHUM CROPS FOR SILAGE

I think there has been enough said, perhaps, on the advantage of the sorghum crops, etc., but I will begin at once to talk on crops for silage.

Sorghum crops, both saccharine and nonsaccharine (sweet and non-sweet), can be used for silage with good results. The corn plant has considerable prestige as a silage crop, and it has been more generally used for silage than any other crop. In fact, its use has become so general that some of the farmers and stockmen have believed that it was the only crop fit to be used for this purpose.

Two years ago the Dairy Department of the Kansas Agricultural College planned an experiment to determine the value of sorghums for silage.

In most parts of Kansas the yield of the sorghums, such as kafir and sweet sorghum, is considerably larger than that of corn, and in some seasons the acre yield is several times larger. It was thought that if these crops could be made into silage, they would be of particular advantage to the farmers and stockmen of western Kansas, where corn is grown with difficulty and much uncertainty.

The first sorghum crop put into the silo was sweet sorghum, commonly called cane. Previous experiments with this crop and the experience of some farmers have given the general impression that cane contains too much sugar, and that silage made from it would be very sour and would not be eaten by stock. Our results the first year showed that silage made from cane did not contain so much acid at any time during the year as did silage made from corn. This, of course, is quite contrary to the belief heretofore held by many, but is easily explained after thought and investigation. In the past, where cane had been made into silage, it had been put up entirely too early. Those who tried it put it into the silo at the same time that they cut their corn for silage. At this stage of maturity, cane contains entirely too much moisture, or sap, and, when put up at this time, is certain to result in sour silage. With us, the cane was not put up until three weeks after the corn silage was made, at which time the cane seed was hard and the stalk was well filled with sap, but did not contain an excess of moisture. The cane used in this experiment was grown on upland soil on the College farm. One-third of the field was drilled and another third was listed. The remainder of the field was in corn. The drilled cane made 12.5 tons of silage to the acre, the listed cane 8 tons, and the corn made 5 tons.

In the fall of 1912, one silo was filled with cane, one with kafir, and one with corn. The following yields were obtained: Corn, 7.1 tons of silage to the acre; cane, 8.2 tons; kafir, 6 tons. The yield of kafir was not a representative one. The season of 1912 was not a good season for kafir, and the early frost cut down the yield considerably. Here, again, we had the same results with the cane as we had previously. It made a good quality of silage, and after analyzing the different silages for acidity, it was found that the cane silage did not contain, at any time during the winter, so much acid as did the corn silage.

First Trial, 1911-1912

In the first year's experiment, cane silage was compared with corn silage as a feed for dairy cows giving milk. Two lots of four cows each were selected from the herd for the experiment. These lots were handled in the following manner:

The cows in lot I were fed for the first twenty days on corn silage. For the second twenty days (after a period of ten days had intervened) they were fed on cane silage. After another intervening period of ten days, the third twenty-day period began, when the cows were again fed on corn silage. The animals in lot II were fed cane silage during the first period, corn silage during the second period, and cane silage during the

third period. It was planned to get a direct comparison of these two feeds by comparing in each case the average of the first and third periods with the second period. Cows gradually decline in milk flow, and the average production of the first and third periods would naturally be about equal to the production of the second period. These cows were fed a grain and a hay ration in addition to the silage. The hay ration was kept constant, and the amount fed was based on what the cows would consume. The grain ration was fed in proportion to the amount of milk produced; this remained practically constant during experiment. The only change, then, in the ration during the experiment was the change made from one kind of silage to the other. The cows were weighed every morning at a stated time in order that a check might be kept on the gain or loss in live weight for each individual.

The following table gives the results of the experiment:

FIRST TRIAL, 1911-1912.

CORN SILAGE VS. CANE SILAGE.

Lot I. Four Cows—Twenty-Day Periods.

Period.	Milk.	Butterfat.	Body Weight.
1. Corn silage in ration.....	1337	55	4108
2. Cane silage in ration.....	1252	51	4131
3. Corn silage in ration.....	1178	49	4106
Av.—1st and 3rd periods, corn silage.....	1257	52	4108
2nd period, cane silage.....	1252	51	4132
Difference.....	5	1	24

Lot II. Four Cows—Twenty-Day Periods.

1. Cane silage in ration	1192	54	4044
2. Corn silage in ration	1167	51	3953
3. Cane silage in ration	989	46	4020
Av.—1st and 3rd periods, cane silage.....	1091	51	4032
2nd period, corn silage.....	1167	51	3953
Difference.....	76		79

In studying the table of results on lot I, we find that the cows declined in milk and butterfat production on being changed from the corn to the cane silage. At the same time there was an increase in live weight when the change was made from corn back to cane silage. During the third period, after the cows had been changed from the cane back to the corn silage, they lost in live weight. This shows a direct influence that the feeding of the cane silage had on the live weight. A study of the table giving the average of the first and third periods at the time the cows were fed on the corn silage, and a comparison of this with the second period, when the cows were receiving cane silage, show that the cows gained five

pounds in milk and one pound in butterfat on the corn silage. It also shows that the cows, when fed cane silage, made an increase in body weight of twenty-four pounds. The increase made in milk, butterfat, and live weight is the total increase made by the four cows in twenty days. The increase made in milk and fat production in favor of the corn silage is so small as to mean little. In fact, the increase shown here is not much more than a variation that would be caused by change from one feed to another, or a change that would be caused by a change of weather or other such variable conditions. The increase of twenty-four pounds in live weight for the lot is a daily gain of a little more than one-fourth of a pound to the cow for the period, which fact suggests that the cane silage is more fattening than the corn silage.

Lot II made a similar showing. As has been observed, the order of feeding was just the reverse of that in lot I. It will be noticed that here the cows did not make a direct increase in milk when changed from the cane silage to the corn silage, but that there was a direct increase in gains when the change was made. A comparison of the average production of the first and third periods with that of the second period shows that the corn silage produced more milk and butterfat than the cane silage, while the cane silage caused gains in live weight. The four cows made seventy-six pounds more milk and a trifle more fat on the corn silage than on the cane. Each cow produced daily three-fourths of a pound more milk on the corn silage than she did on the cane silage. Here, again, the increase in live weight when the cows were changed from corn to cane silage, suggests that the cane silage is more fattening than the corn silage.

Second Trial, 1912-1913

During the winter of 1912-1913, a feeding experiment was conducted with fifteen dairy cows, in which comparison was made of the respective merits of three crops for silage. The general plan of the experiment was similar to the plan carried out the first year. The fifteen cows were divided into three lots. Lot I, of six cows, was used to compare kafir silage with corn silage. Lot II contained five cows, by means of which cane was compared with kafir silage. In Lot III four cows were used to determine the comparative value of corn silage and cane silage. The cattle in each lot were fed for three periods of thirty days each, with a ten-day period intervening between the first and second periods and also between the second and third periods, at which time the changes in feed were made. The experiment included only the thirty days in each period. The grain and hay rations were kept constant, as described in the other experiment. The only change made was in the kind of silage, the amount of silage being kept constant. The cows were weighed each day and the gain and the loss in live weight were noted.

The following table gives the results of the second trial:

SECOND TRIAL, 1912-1913.

LOT I.—KAFIR SILAGE VS. CORN SILAGE.

Six Cows—Thirty-Day Periods.

Period.	Milk.	Butterfat.	Body. Weight.
1. Kafir silage in ration	3373	142	6010
2. Corn silage in ration	3383	140	5994
3. Kafir silage in ration	3339	139	6021
Av.—1st and 3rd periods, kafir silage.....	3356	140	6015
2nd period, corn silage.....	3383	140	5994
Difference.....	27		21

LOT II.—CANE SILAGE VS. KAFIR SILAGE.

Five Cows—Thirty-Day Periods.

1. Cane silage in ration	2384	107	4852
2. Kafir silage in ration	2492	112	4879
3. Cane silage in ration	2139	98	4927
Av.—1st and 3rd periods, cane silage.....	2261	102	4890
2nd period, kafir silage.....	2492	112	4879
Difference.....	231	10	11

LOT III.—CORN SILAGE VS. CANE SILAGE.

1. Corn silage in ration	1953	89	3743
2. Cane silage in ration	1832	86	3747
3. Corn silage in ration	1852	85	3755
Av.—1st and 3rd periods, corn silage.....	1902	87	3749
2nd period, cane silage.....	1832	86	3747
Difference.....	70	1	2

Results of experiments in lot I, in which kafir silage was compared with corn silage, indicate that corn silage is slightly superior to kafir silage for milk production. The cows showed a loss in live weight, however, when changed from kafir to corn silage. The increase of twenty-seven pounds in milk production in favor of corn is very slight for the lot, as this is the increase of six cows for thirty days, or less than one-sixth of a pound of milk daily to the cow. The kafir silage proved more fattening than the corn silage.

Cane and kafir silage were compared in lot II. The results obtained here are more striking than those secured in the other lots. Kafir silage, according to these results, is much better than cane for milk production. Upon comparison of the production during the periods in which the cows received cane silage with the period in which the received kafir silage, it is found that for a thirty-day period in each case, the five cows produced 231 pounds more milk on the kafir silage than on the cane silage. This

means about one and one-half pounds of milk daily to the cow. The cows made a very slight gain in body weight while on the cane silage.

Corn silage was compared with cane silage in lot III. Corn proved superior to cane silage. When the cows were changed to cane silage, they declined in milk production in the second period, as shown in the table; when they were changed back to corn silage in the third period, they showed a general increase in milk. While the cows were on corn silage in the third period, they each produced slightly more than one-half pound more milk per day than they had produced on cane silage. In this trial the cows made a very slight gain in live weight in favor of the corn silage, but this gain is so small as to be negligible.

In summing up the work of both trials, the following conclusions may be drawn:

Corn silage is slightly superior, as a milk producer, to silage made from either kafir or cane.

Kafir silage ranks second as a feed for milk cows.

Cane silage ranks third as a milk producer.

In both trials the cattle gained in live weight on cane silage more readily than on the silage made from kafir or corn. This fact would indicate that it contained more carbohydrates and sugar, or fattening nutrients, than the other feeds. In this experiment the grain and the hay ration were constant, and the only change made in the feeding was in the kind of silage. It is our opinion that cane silage would prove the equal, ton for ton, of corn or kafir silage if the grain ration were changed so that the animal would use the nutrients more economically. This could be done by feeding more protein and less fat-forming nutrients in the grain ration.

Although kafir and cane silage were shown to be slightly less valuable than corn silage from the experiments just explained, there are other factors that must be considered; namely, yield, and adaptability to local conditions. Without doubt, the greater yield of cane and kafir to the acre will offset the slight increase in feeding value obtained from corn silage. Kafir and cane are drought-resistant crops and can be grown over a wider territory than corn, and from one-third to one-half more tonnage to the acre can be obtained.

During both trials the acidity of the cane silage was never more than that of the corn silage. In the second trial the average acidity for the three different kinds of silage was as follows: Corn, 2.03 percent; cane, 1.46 percent; kafir, 1.43 percent.

It was also noted during the experiment that most of the cane seed and a great amount of the kafir seed passed through the animals undigested. This suggests that the nutritive value of these crops as silage is to a certain extent limited to the nutritive value of the stalk and leaves.

The quality of silage obtained from all crops was very good. The kafir silage was perhaps the poorest on account of being immature, as the heavy frost forced an early harvest.

The cows ate the silage with relish. The cane silage seemed most palatable.

The silage was stored in wooden-stave and in cement silos. It kept equally as well in cement as in wood.

The time of cutting cane and kafir for silage is all-important in making good silage from these crops. The crops should be practically mature; that is, the seed should be mature. At this time the stalk is still filled with sap and will make good silage. If put up too green, it will make sour silage. The crops should be put up before frost if possible, but it is better to let the crop stand until after frost than to put it up too green. After a heavy frost, the crop should be cut and siloed immediately. If it dries out too much, sufficient water should be added to cause it to pack well.

A DELEGATE:

Would you add any water to the dry fodder?

PROFESSOR REED:

Yes, sir; you can add up to 50 percent of its own weight. If it is put in out of the shock it needs water added to it. The whole secret is to get it dry enough and then get it packed.

A DELEGATE:

In packing this, would you pack it around the edge of the silo instead of the middle?

PROFESSOR REED:

The way I like to fill a silo is to fill it; keeping the outside a little higher than the center, and when you are about one-third from the top, keep it level or build it from the center a little.

A DELEGATE:

You keep it higher at the sides. Will it not settle down at the middle?

PROFESSOR REED:

Yes; if you do not use care in building it up.

A DELEGATE:

Is there any danger of adding too much water?

PROFESSOR REED:

Yes and no. If you have a silo that the water cannot get out of, there is danger of adding too much.

A DELEGATE:

Have you made any experiments in the feeding value of kafir and feterita as silage?

PROFESSOR REED:

We have not, but as a general thing, the feterita and kafir would

compare very closely. If there is any difference, I should think it would be in favor of the feterita.

A DELEGATE:

What would you consider an equitable basis between the landlord and tenant?

DEAN JARDINE:

I have had no experience but I have some decided opinions. I think the landowner would be safe in erecting a silo and charging say 10 percent on his money.

PROFESSOR ATKINSON:

Would you put him up a corn crib and charge him 10 percent on that?

DEAN JARDINE:

No, I would not do that; but the tenant could well afford to pay him 10 percent on the investment in a silo.

PROFESSOR ATKINSON:

They ought to get the silo anyway.

DEAN JARDINE:

I think it would be a very good business proposition for the landlord to put up a silo, even better than to put up a barn. He would get a better tenant. He would be able to get the tenant to keep livestock on his farm. There is nothing to interest the tenant unless there is something to keep him there. Some of the best farms are those where the landlords have provided means to carry livestock, and it revolutionized the tenant system of the state. It would put the agriculture in a much more permanent position than it is today, as more land each year is going into the hands of tenants; and what we have to do is to make it desirable for those men to keep livestock. Where the tenant gets the benefit of the crops, etc., the landlord will get a better tenant and it will be a mighty good investment for him to put five or six or seven hundred dollars into a silo.

A DELEGATE:

The question the gentleman asked regarding a fair and equitable division does not seem to have been answered. That was what I was most interested in.

MR. WEBSTER:

I wish we had time to go into that discussion, but it would take more time than we can afford to take now. Professor Roy C. Potts of Oklahoma is to speak before this Congress at this time, and we will now hear from him:

Address of Professor Potts

ORGANIZATION AS AN ESSENTIAL FACTOR FOR THE DEVELOPMENT OF THE DAIRY INDUSTRY.

Organization is the keynote of success in the management of any business.

This is true whether that business be the administration of affairs in the home, in the school, in the church, in the state, or in the nation. Unless there is organization and a close coworking of the different phases or departments of the business, the future success and development of the business is not assured.

It is absolutely essential in the administration of affairs in the home that those who do the spending work in cooperation with those who do the earning, else the spendings will be more than the earnings and the result would be that the home would be bankrupt. In the state it is also essential for the most efficient administration of the affairs of the state and the legislature, executive and the department of justice work hand-in-hand; for if the legislative department enact the laws for the punishment of the offenders of the law, also provides appropriations for enforcement of the law, and either the department of justice fails to convict or the executive department uses its clemency and either pardons or paroles, then the offender is still free and the guilty one has not been punished. The work of the legislative department fails because of lack of coordinate action in the other departments in performing their duties. A nation does not undertake a large project like the digging of the Panama Canal until it has worked out a definite program under which the work of the project will be carried out.

A nation with a large standing army has the organization of that army worked out, even to the minutest detail. At the head of each army corps is the major-general, and under him are the colonels, captains, lieutenants; and over each eight men is a corporal. From the major-general to the corporal it is the duty of each officer and of each man under an officer to do the right thing and do it at the right time. That is the reason an army which is well organized, and with soldiers well trained, constitutes such a strong fighting force as they do today. You may say, what has all this to do with the subject under discussion, "Organization as an Essential Factor for the Development of the Dairy Industry?" It is just this. The dairy industry of the United States from the dairyman's standpoint is made up of some 22 million dairy cows. These cows represent a small standing army which produce the milk and dairy products for our nation. Each farmer who owns eight cows is in command and control of them the same as a corporal in the army is in control and in command of a squad of eight men under him. There is no question but what the owner of these cows is as much in command and in control as is the corporal in the military company.

Now where is our next organization in the dairy industry? Fifteen to twenty farmers make up a community. They own perhaps 100 cows. These cows correspond to a company of 100 soldiers. Should there be a captain over them? In some dairy communities the dairy farmers say yes. They

have elected a captain, and his name is the Cow Tester, and his association the Cow Test Association.

There have been a number of of different plans proposed for the organization of cow-testing associations, but of them all none is probably any better than that proposed by Helmer Rabild of the United States Department of Agriculture. The method and plan of organizing as recommended by Mr. Rabild is essentially as follows:

The usual way of organizing an association has been to ascertain the extent of the interest in dairying in a community and to call a meeting and explain the merits of the cow-testing association as an institution. If enough interest is exhibited to warrant going on with the work, a temporary organization is effected, and the neighborhood is thoroughly canvassed during the following few days in search of additional members for the association. When enough have been secured a second meeting is called, at which the organization is perfected, officers elected, and by-laws adopted.

In order to support a cow-testing association it is necessary that there should be 26 herds, conveniently located, and a sufficient number of cows, so that the tester can get a reasonable salary. As it is each member's duty to furnish the tester's conveyance to his next place of work, it is necessary that the farms of the members be located near enough together so he can be conveyed without inconvenience. A distance of two miles is not too great to give satisfaction, and the conveyance is often furnished by some passer-by. If the cow-tester keeps his own horse and buggy, as is the case in some associations, a larger territory is usually accommodated. In such cases the members must furnish feed and stabling for his horse. The charge to the farmer is usually \$1 a year for each cow. The money constitutes the pay of the tester; and it is desirable that there should be not less than 400 cows in an association, in which case the tester gets \$400 a year. In addition he gets his board and lodging free of charge at the farm where he is working. There being only 26 working days in a month, it is not possible to have more than 26 members, except in cases where two men with small herds live very close together, so that it is possible to test both herds in one day. On such farms the regular milking time is fixed so that the tester can attend to the weighing and testing in the first herd and still have plenty of time to get to the second herd by the regular milking hour. In addition to the \$1 a cow, the farmer pays a membership fee of 25 cents yearly. This money, which for 26 members amounts to \$6.50, is used for paying incidental expenses, postage, cost of sulphuric acid, etc.

Perhaps the most important result of the cow-testing associations is the increased interest which members take in their work. Farm work, consisting as it does in large part of manual labor, is apt to become monotonous unless there is an intelligent interest in the operations and unless the farmer has something special in view. The monthly visit of the cow tester stimulates this interest; and while the primary object for which the association was organized is the selection and rejection of individual animals, the results, direct and indirect, cover a very broad field.

The tester, being an expert dairyman, not only studies the individual

animals in the herd as to their capacity for utilizing feed economically, but he also assists the farmer in selecting those feeds which contain the greatest amount of food nutrients at the lowest price, thereby creating a larger net return per cow, per acre, per dollar's worth of feed, and, last but not least, per man. This larger net return per cow is brought about not only by the increased yield of the cow, but by improved economy in the conversion of feed into finished product.

As direct evidence of the value of the cow-testing association, we find that a report of an association in Sweden states:

"This association had in the tenth year 639 cows. Giving the butter a value of 30 cents a pound and the feed units a cost of 2.6 cents a unit, these 639 cows returned during the tenth year \$18,153.99 more than the same number would have returned during the first year, or nine times as much net profit. The cost of this splendid added income is less than \$1 per cow, or less than \$639 a year."

The experience of a dairyman who purchased a \$20,000 farm and gave a \$10,000 mortgage is related by Mr. Helmer Rabild, of the United States Department of Agriculture, as follows:

"There were seventy cows upon the place when it was purchased. These cows averaged 7,320 pounds of milk per year. After keeping records for a year, the owner sold all but 28 of his cows, as they were not making enough profit. He raised the heifers from those 28 cows, and at the end of six years had 71 cows. The extra profit which this better herd has given amounts to \$2,580 every year. It was figured that with the profit which he was receiving from his original herd it would take him 29 years to pay off his mortgage, but with the profit which he is now receiving he can pay it off in three and one-half years."

Now if we will return to the organization of a military company we will find other officers besides the captain and the corporal. They are the lieutenants and sergeants. Where in the dairy community is there a place for such other officers and what would be their duties? I am reminded that in some dairy communities they have breeders associations. Through the cow-testing associations the "boarder cows" are weeded out, and in the Breeders Association the quality of the herd is improved. Now in forming a breeders association, it is necessary that a number of farmers agree that they are willing to breed one kind of cattle. That is, they must agree to use a registered sire of one breed and jointly or in partnership be the owner of a dairy sire which would be used by them all.

Community breeding as it is generally practiced consists of a number of farmers who form an association and buy and own in partnership one or more pure bred, registered sires of the same breed, and by their use seek to improve their stock. Such associations may have three or more members. If twenty members form an association, four or five sires would be required. The members would be divided into sections or groups, and to each group would be assigned a single sire. These groups would be arranged so that the four or five members of each group would be near neighbors. If

but three or four farmers constituted the entire association they must necessarily live near each other.

Requirements for Community Ownership of Dairy Sires.

The first requirement in forming a community breeding association is that those who are interested come together at a meeting and agree upon some one breed. Then they should elect officers and adopt articles of organization and bylaws by which the association shall be governed. It may be advisable for the association to incorporate under the state law if a number of groups are formed and several sires are to be purchased.

The next important step will be the purchase of the sires required. As the breed has already been decided upon, the quality of sires desired and the price they can afford to pay must be considered. In general, the best will be cheapest and the cost will depend upon the popularity of blood lines secured and the reputation of the breeder from whom he is purchased. The sires purchased should be from high producing dams and backed by ancestry of high production. Unless the association is well acquainted with the breeders and pedigrees of the animals it is usually best to buy only from some reliable breeder, or confer with the Dairy or Animal Husbandry Department of your Agricultural College.

Advantages of Community Ownership of Dairy Sires.

The advantages of community ownership are:

1—By the use of pure-bred dairy sires great improvement in the dairy stock is effected.

2—A greater interest in pure-bred and registered dairy cattle is developed.

3—The community becomes popular as a breeding center for one kind of cattle.

4—The increased popularity causes an increased demand for dairy stock, and as a result a higher market value for dairy stock.

5—Dairying becomes more profitable on account of the more economical production of dairy products by the improved dairy cows and the increased value of dairy cattle.

Results of Community Breeding.

No better evidence is needed to prove the good results of community breeding than is found in Minnesota, Michigan, and New York. At Northfield, Minnesota, there are 225 herds of Holstein, consisting of over 4000 grade and pure-bred animals. The fame and popularity of Northfield as a Holstein-breeding center is known everywhere; and it is said they cannot supply the demand. Recently 30 head were sold from one herd for \$9,000. At the county fair held this last fall 84 pure-bred Holsteins were exhibited. It is stated that one of the strongest business forces in the community at Northfield is the community breeding of Holsteins. At Lake Mills, Wisconsin, the organization of an association a number of years ago among a few Holstein breeders has in a few years established a worldwide reputation for Lake Mills as a Holstein center. Here also, the breeders find that

they cannot supply the demand from outside buyers. In a single year \$175,000 worth of Holsteins were shipped from Lake Mills.

At Howell, in Livingston County, Michigan, 125 breeders of registered Holsteins own over 2500 cows, estimated to be worth over \$750,000. Well-bred, registered Holstein heifers sell here for \$200 apiece, and up.

At Syracuse, New York, another Holstein breeding center, the fame of the Holstein has become so great that this community is known as the "Hub of the Holstein World in America." Here single animals have sold for over \$10,000, and cows have produced over 40 pounds of butter per week.

The organization of the community breeding associations is an easy and simple matter where farmers realize the value of organization and are willing to work together for their mutual welfare and benefit. The value of such associations to the dairy interests of a state is inestimable. The work of organizing community breeders associations in Michigan was started in 1908. During the first five months work ten community breeders associations were organized and seven others were partly organized. About 50 pure bred sires were introduced and at least 2,100 cows were bred to pure-bred sires in 1908 which had been bred to grade and scrubs in 1907. Following is a copy of the organization plans of the Michigan Association:

Article 1.—It shall be the purpose of this association to procure and use pedigreed sires for the purpose of improving our livestock through a system of upgrading. This method of improvement implies the continued use of some one kind of pure blood on the grade and mixed bred stock. The association opposes the admixture of the blood of several breeds and the use of cross-bred grade and scrub sires. The association also pledges itself to exert every possible influence for the improvement and furtherance of the livestock interests of the community.

Article 2.—The name of this association shall be _____.

Article 3.—The annual meetings of this association shall be held on the _____.

Article 4.—The officers of this association shall consist of a board of five directors, from which shall be elected a president, vice-president, and a secretary-treasurer, whose term of office shall be one year, except the directors, whose term of office shall be three years. At the first meeting of this association there shall be elected one director to serve one year, two directors to serve two years, and two directors to serve three years.

Article 5.—The president shall preside at all meetings of the association and of the board of directors. He shall countersign all orders for money authorized by the association or board of directors. He shall sign all stock certificates and have general supervision of the affairs of the association.

Article 6.—In the absence of the president, the vice-president shall have the same power and duties as the president.

Article 7.—The secretary shall keep a correct record of the proceedings of the association; also of the board of directors. He shall keep a debit and credit account of the financial transactions of this association. He shall furnish the caretakers of the sires of this association with books

in which to record the service of each sire, together with the date of service, and the owner of the animal served.

He shall settle with the caretakers at least once in — months, giving them a receipt for all money received from them. At the annual meeting of the association each year he shall give an itemized report of the business of the association for the past year, and at the expiration of his term of office shall turn over to his successor in office all books, papers, and all property in his possession belonging to the association. He shall draw and sign all orders for money on the treasurer authorized by the association or board of directors; also make out and sign all certificates of stock of the association.

As treasurer he shall give a good and sufficient bond with at least two securities for twice the amount of money that may come into his hands in any one year. He shall pay all orders for money drawn and signed by the secretary and countersigned by the president. When in funds, he shall keep a debit and credit account of all moneys received and paid out by him for the association. He shall at the annual meeting of this association give a report of amounts of money received and paid out by him and settle with the board of directors by producing vouchers for all money paid out.

Article 8.—The regular meetings of the board of directors shall be on the ———.

Article 9.—The board of directors shall have charge of all the business of the association, except in opposition of a majority vote of the stockholders of the association at regular or special meetings of the association.

Article 10.—Three directors shall constitute a quorum to do business, but a less number may adjourn to another date.

Article 11. Special meetings of the association may be held on a call from the secretary by notification of each stockholder at least 24 hours in advance of the meeting; also on petition of five stockholders to the secretary.

Article 12.—These articles of agreement may be amended at any meeting of the association by a majority vote of those present and voting.

Bylaws Governing Cooperative Breeders Associations

1. It shall be the duty of the officers of this association to purchase the necessary sires and negotiate with competent parties within the association, centrally located, to care for and handle the bulls at a sum not to exceed \$—— per annum.

2. All bulls must be purchased subject to the tuberculin test as a safeguard against the introduction of tuberculosis.

3. No bull or bulls or other breeding animals shall be purchased from any herd in which three or more cases of abortion have occurred during the past three years. (This will make reasonable allowance for accidental abortion and act as a safeguard against the ravages of contagious abortion.)

4. Should any contagious or infectious disease appear in the herd of any member of this association he must forfeit the right to patronize males of the association until such time as his herd is declared free from disease by a competent veterinarian.

5. A service fee of \$1 shall be charged to members of the association, to be collected at time of service. A charge of \$2 will be made to non-members in case the association should decide to accept the patronage of the same.

6. Service fees shall be used to defray cost of maintenance and handling of sires. Any surplus accumulations from this source may be divided among the stockholders as dividends.

7. It shall be the duty of the officers of this association to require and see to it that each sire is kept in a strong, vigorous, healthy condition, in moderate flesh, with plentiful supplies of suitable feed and sufficient yardage to afford ample exercise in the open air and sunshine in addition to the protection of the stable.

8. Bulls shall not be used for service under 1 year of age; nor shall heifers be bred to calve under 24 months of age. During the rush of the breeding season single service only will be allowed.

The development of the dairy industry of a county or a state requires more than mere community organization. A community can produce but it requires a large trade territory to market. Often times the larger part of a county is involved in the trade territory of a single market town. To develop the production end of a business to the greatest possible extent, and entirely disregard the marketing end is considered poor business organization; therefore in developing the dairy business or the dairy industry it is important that the producers look far ahead into the marketing of their products. It is well to ask certain vital questions in regard to the market end of this business: First, who are your competitors in the production of the world's supply of dairy products also for the people of the cities of our own country? What progress are they making? Are you gaining or losing? In what form do you market your product? To whom do you sell it? Do they have a monopoly in fixing the price that you get? In what way is the price you get governed by the supply and demand? What are the profits of the manufacturer and what does the middle man receive?

These are some of the questions we might discuss but time does not permit and we will assume that there is need for more perfect organization of the producers of dairy products in order to get the most out of their products also in order to place their products upon the market in a more satisfactory condition. Every one will agree that such might be true. Now the proposition is, how are we to proceed with our plan of organization to meet this need? It can easily be answered in one sentence. By organizing. The farmer must organize if he is to market most effectively. If he sells milk, and milk is the principle dairy product of the community, then a milk producers association is what he needs. If

cream is the principal product sold, then he should organize a cream marketing association. If butter is the principal product sold, then he should organize a creamery association and manufacture and market butter. I know of the results of such organization for the purpose of better marketing and therefore know that I speak the truth. In Oklahoma, I know of one community where the principle dairy product marketed was milk and before they organized 32 cents to 35 cents was the best that they could get for the butterfat in whole milk. Since they have organized, and now the whole association bargains as one man, they get from 42 cents to 45 cents for their butterfat. In this particular instance it was their organization that gained for them a better market price for their product. I know of other communities where they have organized for the purpose of marketing their cream and where before organizing they received from 6 cents to 8 cents below Elgin for their butterfat, after they were organized they received from 2 cents to 3 cents below Elgin, or an increase of 4 cents to 5 cents per pound butterfat. Other communities have organized creamery associations and they have increased their net returns for their butterfat from 1 cent to 4 cents per pound.

The organization of cooperative cream marketing associations is a rather commendable plan of cream marketing. It is essentially a form of cooperative marketing, where the cream producers organize a local cream marketing association, pool their cream, operate their own receiving station and sell their cream to the highest bidder.

The advantages of such a system are:

- 1.—The testing and selling of the cream is done under the supervision of the officers of the local cream marketing association.
- 2.—Competition in the bidding for the cream obtains a higher market price for cream or a larger commission to the station operator.
- 3.—The quality of the cream can be regulated by the local association by the establishment of grades and classification of cream whereby a higher price is paid for the higher grade or better quality of cream.

The conditions necessary for the establishment of a cooperative cream marketing system may be enumerated as follows:

- 1.—A willingness and desire on the part of a majority of the cream producers in a community to cooperate in organizing a cream marketing association.
- 2.—The perfecting of a local marketing association by the adoption of articles of organization and bylaws, and the election of officers and a business manager.
- 3.—The equipment of a cream receiving station with Babcock tester, scales, wash sink, etc.
- 4.—The contracting for the sale of cream received by the association on the basis of some butter market quotation.
- 5.—The adoption of rules and regulations for the receiving, testing and grading of all cream marketed through the association with a scale of differential prices for the different grades.

The organization of cream marketing associations is a phase of co-operative farm marketing worthy of consideration by any dairy community which has not a local creamery or other local marketing association. In many communities where dairying is not yet extensively developed, a cream marketing association is to be preferred to the premature organization of a local cooperative cream, cheese factory or milk condensery, as a very much smaller investment is required and the difficulties of the management of a factory are eliminated. The successful operation of a large cream marketing association may be the means of testing the strength of the community in cooperation and lead to the later organization of a cooperative association for the manufacture of dairy products, such as butter, cheese, condensed milk or ice cream. In all organization work a certain amount of good business management is required. In the past we have witnessed failures in the operation of a large number of farmers organizations. This is no more true of creameries or other dairy organizations than farmers organizations of other kinds. Poor business management and failure on the part of those who furnish the raw product to cooperate in supporting the home institution is too often the real cause of failure in farmers organizations. What has been accomplished through organization in other fields can be accomplished through cooperation and organization in the dairy industry. All that is needed is the intelligence to perceive the benefits to be derived and the determination to work together to obtain these results. One trouble with our American farmers is that they have harbored so long the idea that they must be independent of every one else, even their fellow-farmers, that they have become selfish in their ideas, and it has become a spirit of selfish independence. As long as this spirit continues it is practically useless for us to think of attaining the greatest development of the dairy industry, for it is certainly evident to most of us, if not to all of us, that organization is an essential factor for the development of the dairy business.

When we can fully appreciate the benefits to be attained by organization in the dairy business, it will be an easy matter to organize cow-testing associations; community breeders associations; cream marketing associations and farmers cooperative creameries. We who appreciate the importance of organization should give of our time and lend our efforts to encourage the dairy farmers of our communities to organize. Education is a slow process. It takes generations to transform a race and it requires many years to change the habits of a generation. The keeping of a poor unprofitable cow is a habit with many dairymen, so is the use of a scrub sire. When our dairy farmers realize that the road is easy to obtain better dairy stock and that their profits will be increased when they cooperate with their neighbors in organizing the dairy interests of their community, you will find they will be quick to seize the opportunity. It is education that is needed and organization is a sure sign of a progressive, thinking people. We should then be teachers, pointing out the

way through organization for the future development of the dairy industry of our country.

MR. WEBSTER:

Owing to the fact that two members who were to have appeared on this program are not here, it has been decided to have Director Thomas P. Cooper of North Dakota give you his talk this morning on "The Business of Farming." Mr. Cooper, of North Dakota, Director of the North Dakota Experiment Station, will now talk to us.

Address of Mr. Cooper

THE BUSINESS OF FARMING

A comparatively short time ago, a discussion of the Business of Farming would have been impossible. The farm and its operation were not considered a business but a means of existence. A family operated a farm and upon it produced the necessities of life—the grain was used to supply the family with flour, the livestock supplied it with meat, milk, butter, and wool. A small portion of the produce was sold to obtain money for taxes and luxuries not produced at home. Little attention was given to organization of the farm for the purpose of profit. With the development of transportation facilities, the increase in population of the cities, and the invention of effective farm machinery, the farm began to be organized on a business basis. Its operations were developed for the purpose of producing products for sale rather than for use in the farm home. Successful farmers began to consider the operation of the farm from the other standpoint of profits. The Central-West led in this development, until today the problem of the great group of central states is primarily a problem of the business of farming. If this business is successful and prosperous, the country as a whole is prosperous. The prosperity of the manufacturer, the transportation companies, and the merchants rests upon the successful prosecution of this greatest of all businesses.

Farmer Confronted by Two Great Problems

The business of farming is complex and manysided. It is affected to a large degree by factors over which the farmer has no control. They may cause disaster in spite of careful forethought and skill, or, on the other hand, may bring a return greatly beyond what would legitimately be expected from the skill and thought expended. There are many factors such as soil, seed, cultivation, diversification, and the proper farm organization, that are dependent upon the farmer. When these factors are properly combined and used they make of the farm a business enterprise rather than a somewhat precarious industry dependent on the elements and wholly a subject of chance. As I conceive it, the application of the named factors and principles involved are essential to the business of farming.

As now constituted, the farm business may be divided into two great fields of effort, one of production and the other of distribution. The relationship between the two classes may be close, as where a highly

organized farm produces and turns the finished product direct to the consumer, or nearly so. On the other hand, there may be a very slight relationship between the business of production and that of distribution. Many of the raw products obtained from the farm are in such an unfinished state that many processes may be required before they are ready for the consumer.

Better System of Distribution Necessary

The development of better systems of distribution which involve less loss and waste, is of vital importance in the farm business. This is particularly true with respect to the more perishable products. Its effect must be to make a larger return on the farm business. Estimates made in the United States indicate that on the average the farmer probably receives 45 cents to 55 cents for each dollar expended by the consumer. It is said that the farmer of Denmark and some other European countries receives 60 cents to 65 cents from each dollar expended by the consumer. The importance of this increased return can scarcely be over-estimated. To obtain it will require the united efforts of communities—the standardization of products, and the development of a closer social structure among the smaller producers. It is obtainable, but as a factor affecting the business of farming it must be solved by groups of individuals. It is a problem of organization and cooperation. Individual efficiency and skill may solve it only to a limited degree.

The problem of production is largely an individual affair. It is this phase of agriculture that is primarily the business of farming. Efficient production is the basis of success in the farm business. One should not infer from this that exceedingly large yields must be produced or that the farm business must be based upon high yields, intensive culture and small acreage. The successful farm business is measured by not income, not crop yields or area farmed. It is based upon the proper balancing and development of the fundamental factors of diversity, organization of the farm, successful production, size of the business, and location. A proper regard for these factors and their development brings success. They may not, however, affect the distribution of the product. This phase of the farm business is dependent upon another group of factors.

Production Important to Individual

Successful farming is an individual problem. As such, it is largely a matter of efficient production and utilization of the products, under an organization of the fundamental factors previously mentioned. It is this phase of the farm business to which I particularly wish to call your attention, rather than that of distribution. The farmer, as an individual, has within his control the primary factors which affect efficiency of production, and consequently determines to a large degree through this efficiency the success of his farm enterprise and his business as a whole. He may determine to a great extent the character, quality and quantity of his products. The price obtained may be affected to a very slight degree by his wishes, but he has within his control, to a considerable

degree, the cost of production, and to some degree, the margin of profit which may be secured. In consequence, this phase of the farm business becomes one which may be affected by direct work and education of the individual. It is this feature of the business of farming which determines to a very large degree the prosperity of the farmer, of the state and of the nation. Although it represents but one part of the whole, it is that part which is most capable of great development. But bear in mind that this may not be in terms of total **increases in production**, but rather in **efficient production**.

Need of Greater Efficiency

The question of the need of greater efficiency is best answered by the results of the farm business in the United States. A careful estimate based upon the farm operations for 1913 shows that the average labor income per farm was \$318.22. That is, that this sum plus the farm home garden and all farm supplies other than milk and cream, represents the total earnings of the farmer and his family. The returns vary in the different sections of the United States, but the average is comparatively low in every section.

If a country is to prosper, have good schools, roads, homes, and public improvements, the income of the farmer must be increased. The business must pay a greater return. And again, I wish to call attention to the fact that it does not follow that this means increased crop or livestock production. It does mean more efficient production. Compare the results for the United States or any section with groups of successful farms, for these may be found in every community, and the importance of an efficient agriculture is readily determined.

Several surveys have been made in various sections of the United States to determine the factors affecting efficiency in the farm business. From these surveys comparisons may be obtained which show to a marked degree the result of efficiency as applied to the farm business. In an investigation of the three groups of farms located in townships in Indiana, Illinois and Iowa, it was found that, "One farmer out of every twenty-two received a labor income of over \$2,000 per year. One farmer out of every three paid for the privilege of working his farm, that is, after deducting 5 percent interest on his investment, he failed to make a plus labor income." A similar investigation in three townships in New York indicated that, "One-third of the farm owners made less than hired men, one-third made about the same as hired men, and one-third made more than hired men." With slight changes, it is found that this statement is approximately correct in apparently prosperous sections, while the percentage of unprofitable farms increases in the less prosperous sections.

Cause of "No Profits."

The conclusions drawn from a careful study of the farm business indicate that the "unprofitable" farmer fails to make a profit because of neglect of a few simple principles. The difference between the successful and

the unsuccessful farm is largely a question of applied efficiency in production, and organization of the farm business. A recent publication covering investigations in the corn belt as to causes of profits or losses on the farm states that the farmer fails to make a profit "through neglect of work, low crop yields, inefficient stock, poor farm organization and unused capital. His expenses are practically the same per acre as the good farmer. His receipts are the weak point. His neighbors succeed, not by spending less but by taking in more." There is no reason to believe that the conclusions as obtained from groups of farms are not applicable to every agricultural community. They may be even more prominent in the region in which many of us are interested. In this area particularly, the difference between the continuously profitable farm and the unprofitable one is dependent not only on the factors named but on a diversification and organization which will enable the owner to obtain a sufficient income to cover operating expenses in even the dry years.

How Profits May Be Made.

Warren of New York, in his study of farm organization, states that the four factors of greatest importance in affecting profits "have been size of business, crop yields, production per cow or of other animals (productivity), and diversity of business. In few cases do practical farmers make other mistakes of so serious a nature as to prevent getting a good labor income if these four factors are favorable." Of the four factors essential to the success of the business of farming, three, viz., crop yield, productivity of livestock, and diversity, may be determined to a large degree by the farmer, while the size of the business responds readily to increased labor force. On our most successful farms, the crop yield per acre is approximately 20 percent better than the average in the neighborhood. The productivity of livestock, as determined by the dairy cow, must be approximately twice that of the average in the state. Thus we may trace the leaks in the farm business, to a very large degree, to inefficiency in production of crop or livestock products and to lack of diversification. Correct these troubles on the farm, and to a considerable degree you have corrected the greatest difficulty in the way of profitable farm business.

The Development of Efficient Agriculture.

It has been shown that one-third or more of our farmers operate their farms at a loss. Another third to one-half obtain a relatively small income, one which is unsatisfactory from the standpoint of business management, while approximately one-sixth, about 14 percent, pay themselves a fair rate of interest on their investment and a fair labor income for their year's work.

The great problem of agriculture is the development of at least a fair degree of efficiency in the farm business among the remaining 86 percent of the farm operators. Men do not operate the farm business on an unprofitable basis because they wish to or because it is pleasant. All men desire prosperity for themselves and their families. Furthermore, it has been demonstrated time and time again that it is possible to increase the

efficiency of the individual and of the agricultural community. Inefficiency on the farm, the store, or the factory, is not a problem that is unsolvable.

How to Increase Farm Efficiency.

Farm profits may be increased by the education of the individual and teaching methods which will bring profits. This can be accomplished among the boys and girls by our colleges and schools. Our farms, however, are in the hands of men in the prime of life. They will operate these farms for the next twenty or twenty-five years. For this reason, the problem of adult education is as important as that of the boy and girl. It deals with the present and determines our prosperity and effectiveness for a quarter of a century hence.

One, if not the most effective, method of obtaining this result is through the use of the field agent and farm demonstrations. This man, located within a restricted district, is in daily contact with the farmer. He may through the establishment of demonstrations in alfalfa, livestock feeding or care, crop rotation, corn production, or other phases of farm practice, call attention to the possibilities of the production of that region. Successful demonstrations are followed in the community and within a comparatively short time marked changes may be brought about in a community or the state. The effectiveness of this form of work and its application may be illustrated by some of the work which has been carried on by the Better Farming Section of the North Dakota Experiment Station. Work has been under way for three years now. Twenty-four field agents are employed. One of the problems of the state was to secure a greater diversification through the use of livestock. Within three years the acreage of alfalfa increased from 3,033 acres to approximately 90,000 acres, or was multiplied thirty times. The corn acreage slightly more than doubled, increasing about 125 percent. The average yields for the five years preceding 1911 when work began was 23 bushels per acre; and for the three years since work was started, 27.6 bushels per acre, an increased yield of 18 percent. The number of hogs sold from the state in 1913 was more than double that of any previous year, and 150 percent greater than the average of the five preceding years. It is estimated that the sales this year will again double those of last year. The sale of milk and dairy products has practically doubled within three years, while at the same time, the number of dairy cows have increased tremendously, 28,547 in two years. Careful estimates at the present time indicate that the increased sale of livestock products from the state will be eight and one-half millions of dollars greater than three years ago, and at the same time the total production of wheat, oats, barley and rye is practically the same. Increases or decreases in the total production of these crops, with the exception of flax, have been slight.

The reason for these changes may be attributed to various factors. Their importance is a matter of opinion. However, during the period of this change, but one new force has been introduced, viz., the field agent carrying his message of Better Farming direct to the individual on the farm.

In conclusion, the careful student of affairs cannot fail to admit that the farm business is relatively inefficient from a profit standpoint, and that

the betterment of this condition is largely dependent upon the application of few simple principles of agriculture or of organization. These are within the reach of every farmer and are dependent largely upon himself. It is a question of efficiency—and is individual.

MR. WEBSTER:

Just a moment now. Please don't get in a hurry. It is almost noon, but I want to introduce to you a man whom many of you know—the new Secretary of the State Board of Agriculture in Kansas, Mr. J. C. Mohler.

MR. MOHLER:

A speech, no matter how full of meat, will hardly take the place of luncheon; and the nearness of the noon hour, I am going to take as an excuse to cover so far as I may my limitations as a platform performer.

Being injected into this program so unexpectedly makes me think of the story I was told not long ago. A farmer had a very vicious bull, in fact it was so vicious that the farmer could not do anything with him and offered \$5 to have this bull brought in dead or alive. One young man thought that was easy money so he buckled on his sixshooter and started out. The bull was lying over there in the pasture all unsuspecting, and he seemed to be surprised that anyone had the audacity to come in the same corral with him. Thereupon the young man got excited, fired his gun, and hit the bull, just grazing the skin. The bull becoming infuriated started after the young man, who ran as fast as he could, yelling, "Open the gates, I am bringing him in alive!"

My apparance on this program is almost as sudden as the manner of bringing in the bull, but I am willing, if not able, to do whatever is asked of me.

This Dry-Farming Congress is the only dry thing in Kansas this year, and it is dry in name only. You men from other states or other countries, no matter how fair they may seem to you, must be pleased with the dress that Kansas is wearing with which to greet you on this occasion. Her wheatstacks are evidences of our rich wheat harvest, which is the largest any state ever grew. The long alfalfa stocks, our kafir and sorghum and corn which are now in shock, must present a picture to you; but with all our abundant crops that is one great need in our agriculture, and that is more livestock. That applies, of course, to the dry-farmer as well as the farmer in the humid region. Our statistics show that livestock has decreased in Kansas about 30 percent in the past five years. This year we have a big crop and not enough stock to eat it up. There is not much incentive to raise a big crop of forage if you have no livestock.

This Congress, with its worldwide interest, is of universal importance. Its principles, if applied to the vast regions of limited rainfall would prove of great value to agriculture. I am glad this Congress met here in Kansas this year. It has been magnificently officered. Look at Doctor Waters, the man who was at the head of this Congress this year. He is without a peer in this country. Mr. Faxon always hustled, always worked for the

success of this Congress. Many others have contributed handsomely toward it. I know you have had a splendid 3-days program and I am satisfied you have been given a very cordial welcome and I hope you will come again.

I thank you.

SECRETARY FAXON:

All members of all committees—the retiring Executive Committee, the new Executive Committee, the Committee on Resolutions, the Committee on Nominations—are asked to remain in the room for a very few minutes.

This announcement is made at the request of Chairman Drummond of the retiring Executive Committee.

The Congress was then at recess until 1:30 o'clock.

THURSDAY, OCTOBER 15, 1914

AFTERNOON SESSION

SECRETARY FAXON:

The Congress will be in order. The session of this afternoon includes one address, and then the transaction of the routine business of which there is considerable. The chair will be in possession of Vice-President H. M. Bainer, of Texas, who will now take charge of the session.

MR. BAINER:

We are going to depart from the regular program as printed, this afternoon, and the first thing on the program will be an address by P. E. Crabtree, Specialist in Farm Management, Kansas State Agricultural College, who will address you on the subject of "College Extension Service." Mr. Crabtree.

Address of Mr. Crabtree

COLLEGE EXTENSION SERVICE

"College Extension Service" is a service comparatively new, little understood—by the general public—and of increasing interest. We may well consider it, briefly, from three points of view:

Why College?

Why Extension?

Why Service?

"Why College?"

A human being is born. It inherits, of physical ability, about eight pounds—of mental ability, not much—about the same as the calf or the colt. Morally, it is all right in the beginning. Obviously, the duty is to build up the next 150 pounds of the right kind of material, to possess it with a mentality equal to the occasion in every respect, and to keep the moral strength untarnished, unrepachable.

A man or a woman can only hope to attain to the high plain and

exalted position that the terms imply, and thus be able to take his place in the world of today and contribute to the accomplishments thereof, when possessed with a really high degree of development, **physically, mentally, morally.**

The college, supplied with an efficient corps of instructors, equipped with libraries, laboratories, and demonstration supplies, and surrounded by social advantages and conveniences best calculated to stimulate the correct impulses of the budding manhood and womanhood, has been found to possess distinct advantages for the encouragement of **ambition**, the development of **cooperation or class spirit**, and the formation of **high ideals**, so necessary in life's battles.

"Why Extension?"

Notwithstanding these facts, a little search among statistics shows us, that on the whole, less than four per cent of our youth are actually securing the benefits to be derived from such complete college work, and, therefore, the overshadowing question is, **"How can we reach this other 96 per cent of which our citizenship is soon to be composed?"**

The attempt has been made. Realizing that as one has said **"knowledge is power"**—another has said, **"The mind is the measure of the man,"** each tending to show that human beings really look more alike than they act alike, it appears to be correctly summed up in one trite, brief definition, **"Education is the development of that which distinguishes man from animal—the preparation of a person for his life's work."**

This 96 per cent of persons less fortunate, must be reached, to the fullest extent that they are **"susceptible to suggestion,"** and everything possible must be done in the preparation of them for their **"life's work."** The plan of **"taking the college to them,"** thus enabling them practically to begin life where others have left off, is called **extension service** and the various lines hereinafter enumerated have been extended from the college into the **homes** throughout the length and breadth of our state and even into the penal institutions of the state, where most satisfactory results have been accomplished during the past year, in the **state, federal, and military prisons.**

"Why Service?"

It may be possible that in the evolutionary process of human events, man was once a very selfish type of animal and cared nothing for **approbation**, little for **companionship**, had no **conscience**, and had not his pathway illuminated with **hope**, but certainly not so today. Modern science has so **systematized** the application of effort, so **simplified** the processes of nature and so increased **efficiency** along all lines, that but a scant share of one's lifetime is required for the production of the **"necessities of life,"** leaving the remainder of one's time to be devoted otherwise, and the modern man and woman have not been slow to take advantage of the opportunity.

Service—service of the highest class, is the result. Service not alone to one's self, but **public service** as well. Service to humanity, not only

in the **present tense**, but service for **"all time to come."** Apparently as immense degree of satisfaction is obtained in **doing good** for the very love of it and the person who can penetrate the future furthest with a **correct vision** is the one who most fully enjoys life and has the most promising impressions of the future. This is most forcibly evidenced in the splendid work of our **humane societies**, **Red Cross** and other **relief organizations**, **public libraries**, and various **endowment funds**, all pointing clearly to the fact that **modern man** is, more than ever before, built along lines of **public service**, and is, therefore, incomplete without it.

"Agricultural College Extension Service"

Eight years ago, our extension service consisted alone of **"farmers institutes,"** since which time have been added:

Regular lectures; special lectures; movable schools; farm inspection; farm demonstration; superintending of construction; construction of county fair exhibits; judging county and other fairs; demonstration of judging methods; superintending state fair; district agricultural agents; county agricultural agents; insect control; veterinary service; purchasing and sales service; **cooperation** with clubs, churches, woman's auxiliaries, high schools, boards of health, social centers, literary societies, and Young Men's Christian Associations; social surveys; editorial work; mechanical application and demonstration; highway engineering—plans and supervision; drainage engineering; irrigation engineering; home economics; domestic science; domestic art; demonstration of above; correspondence course on above; organizing for the promotion of any and all of the above.

Our extension service is now administered by 41 specialists, each in charge of the **detail** of his respective lines, managed by one dean of extension, one superintendent, one assistant superintendent, the whole in **cooperation** with, and **subservient** to the general departments of the college.

"Standing"

We feel that we can safely say that **"college extension service"** is the **newest**, most far-reaching, and we believe, one of the most popular means for the **acquisition**, **systematizing** and **dissemination** of knowledge; that kind of knowledge which prepares a person for his **"life's work."**

"Seeing Things Rightly"

If we will see things as they are—for **"things are not always as they seem"**—we will realize that, to the youth, life is so largely an **"exploring expedition."** We shall not expect to find **"old heads on young shoulders"** no more than we should to find young heads on old shoulders. We will realize that our **Creator** has decreed that the **natural** course of procedure for **humanity-in-the-making** is to be a **"faddist"**—to ride to death one **"hobby"** after another, until the young man has reached about the age of 35, and the young woman about the age of 28,—if you could find out her age—at which time, on an average, they shall have mounted that **hobby** which was to have become their **"life's work."**

"Our Life's Work"

We would, therefore, then, **expect** to find the citizen of Switzerland,

personally, collectively and **nationally** interested in **manufacture**, for Switzerland is a manufacturing nation. Similarly, we would expect the citizen of England to be interested in **commerce**. With us it is different—since practically every person present lives in a **good part** of one of the **best agricultural states**, in the **greatest agricultural nation on the face of the earth**, it is so apparent, since we respect an acre of land only because of the **soil fertility** which it contains, that “**our life’s work**” is a three-step process of transformation, transforming **soil fertility** into **plant life**, plant life thus made into **animal life** and animal life thus made into **human conveniences**.

“Illustrations”

Happy the thought that **today** you can see “bossie” plucking the blade of grass from yonder hillside. **Tonight** you can milk the same substance into the pail. **Tomorrow** you partake of the same in the form of food. **Another day’s** exercise, and **another night’s** rest, and you can **transform** into thought the word—yes, if you were a Walt Mason, into **verse**—the same substance that this moment is tied up in the blade of grass, for which “bossie” is searching, and that a few brief hours before has lain beneath “bossie’s” feet in the form of soil fertility yet unused.

Hence, the necessity for college extension service!

MR. BAINER:

Now, there is one thing perhaps that Mr. Crabtree did not tell you and that was the number of people they have in the Extension Department there doing work over the state, which is 41. I want to say that I come in contact with a number of the people, all doing this work, and in connection with this work, I do not know of any other institution that has as successful a department in extension work as the Kansas State Agricultural College has today.

An excellent address has been prepared by Joseph Hirsch, of Corpus Christi, Texas, a member of the Agricultural Commission of the American Bankers Association. Since he is unable to be present his address will be read.

Address of Mr. Hirsch

PRACTICAL COOPERATION BETWEEN BANKERS AND FARMERS— THE TEXAS PLAN

The great interest that has been aroused in the better farming movement among the bankers of America is now so generally known that it is hardly necessary to comment upon it, except briefly, at this time. The appointment of Agricultural Committees by several of the State Banking Associations began as early as 1909, and in 1911 there was held at Minneapolis the first Conference of Bankers Committees on Agriculture. This Conference was attended by the representatives of seven states. At this writing forty State Bankers Associations have regular Agricultural Committees, and the interest aroused and the good work accomplished has grown to such an extent that last year, for the first time, the American

Bankers Association appointed a special Agricultural Commission from among its members, which Commission I have the honor of representing upon this occasion, and, on this very day, October 15, 1914, the American Bankers Association now in session in Richmond, Va., is devoting its entire morning's program to an agricultural symposium.

Probably the most interesting feature connected with the work of the American Bankers Agricultural Commission has been the publication of the Banker-Farmer, a review of the bankers's activities for a better agricultural and rural life, which has been circulated to the extent of about twenty-five thousand copies per month, and which reaches some nineteen thousand bankers of the United States regularly. Its able editor, Mr. B. F. Harris, of Champaign, Ill., Chairman of the Bankers Agricultural Commission, has performed a great service for the bankers of the Union. It was due, largely, to the work of Mr. Harris and to that of Mr. Joseph W. Chapman, Vice-President of the Northwestern National Bank, of Minneapolis, and for several years President of the Conference of Bankers Agricultural Committees, that the appointment of these special Agricultural Committees from the Bankers Associations has spread to almost every State in the Union.

The Agricultural Committees from the various State Associations have many individual problems confronting them, and each Committee works along its own lines, but the general result of the work of these Committees has been largely the same, in that they have uniformly taken an active interest in the development of the Agricultural and Mechanical Colleges of the various States, and increased appropriations for the same, in the extension of agricultural education in the rural schools, and, particularly, in the work of adopting the rural high school plan in place of the old time, single room school buildings scattered all over America, in the building of good public highways, and, LAST but not least, in the extension of the field demonstration work of the United States Government to practically every State of the Union, through the passage of the well known Smith-Lever Bill, which now permits every State in the Union to obtain Governmental appropriations for field demonstration work, contingent upon the State, the county or the municipality appropriating an equal amount for such assistance.

It seems to be the general concensus of opinion that the work of the UNITED STATES DEMONSTRATION AGENT, or, as he is better known in many parts of the north and middle west, the COUNTY AGENT, is of the greatest importance to our rural communities. This Demonstration work permits the agricultural college of each State to be taken direct to the farm, instead of taking the farmer to the college. And it is to the extension of this field demonstration work to every county of our State that the Bankers Association of Texas has devoted its principal efforts. Our Agricultural Committee has appointed a banker Sub-Chairman of Agriculture in every county in Texas; two hundred and forty members in all. These bankers have worked with their County Commissioners, Boards

of Trade, and other business organizations, raising local or county funds to meet the Government appropriations, so that we now have over one hundred paid County Agents in Texas who are teaching better farming to the farmers and the farmers's children of our State.

The methods we have followed in Texas are so simple that I think they should commend themselves to the attention of every State in the Union, for I believe the best and most practical results can be accomplished where you have an individual worker in every county and township in your State. These banker Sub-Chairmen are now being urged to call meetings of all the bankers in their respective counties, and to invite country merchants and farmers to these meetings. Let us say that an individual county, in Texas or any other State, has five villages—it is very simple and inexpensive to have a meeting once a month, changing the meeting place each month. This stimulates local interest. We are endeavoring to show the country merchant how necessary it is for his business that credit be extended only to those farmers who, through diversification and sufficient investment in livestock, put themselves upon a self-sustaining basis. We advocate the banking policy of lending money for "BETTER FARMING," and if that is a sound policy, and WE KNOW THAT IT IS, it is equally sound to refuse our credit to those farmers who continue to work along the old lines of farming one crop only. With the country banker and the country merchant sufficiently aroused to the importance of this work, it is easy for the County Agent to get results. Many County Agents received slight encouragement from the farmers when they first began their work in the field, but the bankers and the country merchants, who are close to the farmers, are advising them to carry out the ideas and follow the instructions of the County Demonstration Agents, and, with the County Agent, the farmer, the banker and the country merchant working together, we are bound to get results.

I believe every person attending the International Dry-Farming Congress ought to familiarize himself with the provisions of the Smith-Lever Bill, and see that the particular county of his State receives the appropriation to which it is entitled under this act, providing the county appropriates an equal amount for the purpose. Under this act the State of Texas, alone, will receive, beginning with \$36,000 in 1915, and increasing annually by some \$30,000, an amount which will reach the sum of \$246,000 in 1922. The appropriation for each State is made in the proportion that its rural population bears to that of the entire rural population of the United States. One of our prominent agriculturists has said that "with the exception of the Currency Bill, it is believed that the passage of the Smith-Lever Bill will do more good to more people than any other act passed since the Civil War."

An experience of several years in this work convinces me that the only way to reach the farmer who needs HELP THE MOST, is by PERSONAL WORK IN THE FIELD. I have attended many agricultural conventions, and I have no doubt that this great International Dry-Farming

Congress, which is nothing more nor less than an International "Better Farming" Congress, differs not a whit from many I have attended, in one respect, in that it is more than likely that it will be attended by the BETTER FARMERS of the country, by those farmers who have ALREADY DEVOTED considerable thought to the problems of farming, and who, therefore, need the benefit of the instructions received here, the least. THOSE WHO NEED OUR HELP THE MOST, my friends, are NOT HERE TODAY, and you can not reach them with speeches; you can not reach them with agricultural bulletins—the only way you can reach them is by a trained agriculturist, a man who combines the scientific and the practical knowledge of farming, who can work with and be one of them. And it is to the extension of this kind of work that we, of Texas, have devoted our chief efforts. We believe THIS so fully that we are not only lending our efforts to putting these trained agriculturists into every community in our State, but we are backing up our own faith in it by extending a willing hand to those farmers who will work with the bankers of Texas for "BETTER FARMING." We are lending our money for dairy cows, for hogs, for silos, for everything that tends to make the farmer independent, and we shall equally refuse to assist those who are so blind to their own welfare that they will not make the effort to help themselves, and if there is one thought I should like to leave with this assembly, it is that we must not only endeavor to arouse the FARMERS of America to the importance of this great "better farming" movement, but we must, at the same time, educate our country banker and our country merchant, and endeavor, so far as we can, to get unity of action in the matter of extending a wise and judicious system of credit to those entitled to receive it. The bankers of the Union have recently had a salutary lesson from the Secretary of the Treasury in the withdrawal of Government funds from banks not employing them along proper lines, and once we show the farmers of this country that the HELP of THE BANKS and the HELP of the COUNTRY MERCHANTS will be WITHDRAWN from those who do not apply the assistance received along sound lines, we shall have gone a long way, indeed, toward stimulating a greatly increased interest in the better farming movement.

SECRETARY FAXON:

Mr. President, the Chairman of the Committee on Nominations is ready with his report.

MR. BAINER:

Mr. Dillon, we will now hear the report of the Committee on Nominations.

MR. DILLON:

The Committee on Nominations begs leave to submit the following report and recommends its adoption:

For President of the Congress—F. W. Mondell, of Wyoming.

First Vice-President—W. C. Edwards, of Wichita, Kansas.

Second Vice-President—L. A. Merrill, of Salt Lake City, Utah.

Third Vice-President—Thomas P. Cooper, of Fargo, North Dakota.

Mr. President, I move the adoption of this report.

MR. BAINER:

The motion has been made that the report be adopted. Do I hear a second?

The motion is seconded.

Are there any remarks? If not, all in favor of the motion, make it known by saying "Aye." All opposed, "No." The nominations are adopted as reported by the committee.

SECRETARY FAXON:

Mr. President, I believe the Chairman of the Executive Committee has a suggestion to make at this time. Mr. Drummond.

MR. DRUMMOND:

I believe what should come next would be the reading of the revised draft of the Constitution, by the Chairman of the Amendments Committee, Doctor Humbert.

DOCTOR HUMBERT:

There was a committee appointed, consisting of myself, President Worst, Dean Jardine, Mr. Mantle and Consul Pasmezoglu, which conferred with the Chairman of the Executive Committee regarding some amendments to the constitution. The amendments proposed make it almost a new constitution and it seems to me it is of sufficient importance so the people who are interested should hear the constitution as it is recommended by this Committee and the Executive Committee. It seems to me the easiest way to get at it will be to read the draft which we have here. It is not so long. If there are parts which you wish to consider—something which does not suit the consensus of opinion, we will take them up in turn. With your permission I will read the constitution as revised by this Committee and the Executive Committee.

Note: The constitution was read, and is printed in full at the close of this volume.

DOCTOR HUMBERT:

In order to get it before the House, I would move the adoption, if that is in order, of the constitution as read and I believe it will then be open to remarks if you have suggestions to make.

MR. DILLON:

Mr. President, is this a new constitution?

MR. BAINER:

This is practically a new constitution.

MR. DRUMMOND:

This is an amended constitution.

MR. BAINER:

The motion has been made and seconded that this amended constitution be adopted. Are there any remarks? All in favor of the motion make it known by saying "Aye." All opposed, "No." The motion is carried. Are there any other reports of committees?

I believe there should come in a report at this time from the Committee of the Audit of Accounts. Doctor Worst of the North Dakota Agricultural College was appointed Chairman of the Committee, and together with Mr. Nielson, and myself to audit the books of the Secretary-Treasurer. The books have been carefully looked over and we find them correct. I will make the report as written out by Doctor Worst.

STATEMENT OF INCOME AND EXPENDITURES

International Dry-Farming Congress

October 14, 1914.

Balance October 21, 1913.....\$306.21

Income as under

Foundation Fund	\$1554.48
Sale Prize Wheat	26.25
Subscriptions	1070.25
Life Memberships	100.00
Sale Widtsoe Books	30.35
Advertising	270.88
Women's Congress	32.00
Montgomery Ward & Company, App'n.....	50.00
Wichita Contract	6638.57

9772.78

\$10078.99

Expenditures as under

Salaries	\$5939.17
Executive	1370.43
Printing	1317.40
Postage	861.33
Telegrams	36.29
Cartage	15.01
Sections	8.65
Freight	64.89
Supplies	32.42
Advertising	216.56

\$9862.15

Balance October 14, 1914.....216.84

\$10078.99

Balance due on Wichita contract.....\$1361.43

CHAIRMAN BAINER:

The committee then appends this statement to the foregoing:

"Mr. President, your committee appointed to audit the accounts of the Executive Secretary-Treasurer has this day performed that duty and respectfully reports that, according to its judgment, the accounts are correct, and that the Executive Secretary-Treasurer is entitled to the thanks of this Congress for his untiring efforts to promote the interests of the Congress for the year 1914.

Respectfully submitted,

J. H. WORST, Chairman,
H. M. BAINER,
NIEL NIELSEN.

CHAIRMAN DRUMMOND:

There is another item in the assets, Mr. Bainer. Please read it.

MR. BAINER:

There is outstanding yet for collection on Wichita contract \$1361.43.

CHAIRMAN DRUMMOND:

This, added to the cash balance you have on hand now, gives the total cash balance.

MR. DILLON:

Mr. Chairman, I move the adoption of that report.

MR. BAINER:

Do I hear a second?

Seconded.

MR. BAINER:

The adoption of this report has been moved and seconded. Are there any remarks? All in favor, make it known by saying "Aye." All opposed, "No." The motion is carried. Are there any other reports of committees at this time?

MR. DILLON:

Now, Mr. Chairman, if it is in order, I would like to make a motion that a vote of thanks be extended to R. H. Faxon for his untiring efforts, his excellent management of everything in his department.

MR. BAINER:

The motion has been made that the Congress thank R. H. Faxon, the Secretary-Treasurer, for the very effective work done for the Congress during the past year. Is there a second?

MR. MANTLE:

I have great pleasure in seconding that motion.

MR. BAINER:

The motion has been made and seconded that a vote of thanks be extended to R. H. Faxon, the Executive Secretary-Treasurer, for his efforts in behalf of the Congress.

MR. MANTLE:

I would like to suggest that we make this by a rising vote.

MR. BAINER:

It has been suggested that we make this a rising vote. The motion is unanimously carried.

MR. DILLON:

I have one more motion to make, and that is that the Secretary be requested to draw up a resolution, for presentation at the proper time, expressing the thanks of this Congress to the citizens of Wichita in every branch of industry that has contributed to this great meeting and to the press of Wichita, and that about covers the question I believe; but I want those to participate in this resolution—the people and the press.

MR. BAINER:

You have heard this motion. Do I hear a second?

Seconded.

MR. BAINER:

The motion has been made and seconded. Are there any remarks?

MR. KNIGHT:

The motion was to instruct the Secretary, was it not?

MR. BAINER:

It was. All in favor of the motion, make it known by saying "Aye." All opposed, "No." The motion is carried. Is there any other business to come before the meeting at this time?

Note: The report of the Committee on Resolutions was here presented. The resolutions appear at the close of this volume.

A DELEGATE:

Has the meeting place for next year been decided upon?

MR. BAINER:

It has not.

CHAIRMAN DRUMMOND:

After we get through with this general session, the Executive Committee will be in open session and the question will be answered then. I will say the matter of locating the next meeting place is largely a matter of contract. We have a number of invitations but before we accept those invitations, we want to know what the surroundings are in those places and

we want time to investigate, and it is customary to have the Board of Governors close this contract, so it has been left to the Executive Committee or the Board of Governors to make the best arrangement it can. That is why this has not been brought up in open session.

MR. BAINER:

Is there anything else to be brought up in the session now before the session of the Executive Committee comes up?

CHAIRMAN DRUMMOND:

I would suggest that you do not adjourn but simply take a recess and then reconvene and adjourn. There may be something we have overlooked.

DEAN JARDINE:

I move that a recess of 10 minutes be taken, after which we will again resume in general session.

MR. BAINER:

The motion has been made and seconded.

All in favor of the motion, make it known by saying "Aye."

All opposed, "No."

The motion is carried.

Note: The Congress was then at recess, and the Executive Committee in session.

W. I. DRUMMOND, Chairman of the Executive Committee:

We will come to order as an Executive Committee right away. The old members and the new members are requested to remain, and anyone else who cares to remain may do so.

There will be an accounting later, of course, of the affairs of the Executive Committee, and a report made to the new Committee, and to the Board of Governors.

Meanwhile, what is the pleasure of the Committee?

DEAN JARDINE:

I move that the old Committee be discharged; that it be dismissed with thanks for its splendid services during the year.

MR. MANTLE:

I second the motion, Mr. Chairman.

Accordingly the retiring Committee was discharged.

CHAIRMAN DRUMMOND:

The Secretary will now read the list of the members of the new Executive Committee, so far as reported to the Congress during these sessions.

Secretary Faxon read the following list:

EXECUTIVE COMMITTEE

Arizona—A. M. McOmie, Phoenix.
Arkansas—E. N. Hopkins, Fort Smith.
California—
Colorado—Charles A. Lory, Fort Collins.
Idaho—E. J. Iddings, Moscow.
Kansas—W. M. Jardine, Manhattan.
Minnesota—T. A. Hoverstad, Minneapolis.
Missouri—F. L. Vandegrift, Kansas City.
Montana—F. B. Linfield, Bozeman.
Nebraska—E. A. Burnett, Lincoln.
New Mexico—E. P. Humbert, State College.
North Dakota—L. R. Waldron, Dickinson.
Oklahoma—W. I. Drummond, Muskogee.
Oregon—H. D. Scudder, Corvallis.
South Dakota—A. N. Hume, Brookings.
Texas—H. M. Bainer, Amarillo.
Utah—L. A. Merrill, Salt Lake City.
Washington—E. A. Bryan, Pullman.
Wyoming—A. E. Bowman, Laramie.
Canada—John Bracken, Saskatoon, Saskatchewan.
Belgium—Dr. A. L. Bauwens, Brussels.
Brazil—
China—Dr. J. L. Young, Peking.
Greece—Hector M. E. Pasmezoglu, Saint Louis, Missouri.
Hungary—Dr. Bartholomew Nemenyi, Budapest.
Mexico—N. P. Escobar, Juarez.
Rumania—D. I. Andronescu, Urbana, Illinois.
Russia—William P. Anderson, Saint Louis, Missouri.
Spain—Gregorio Cruz Valero, Madrid.
Turkey—Izzet B. Suryieh, Urbana, Illinois.
Union of South Africa—Colonel A. J. Bester, Colesburg, Transvaal.

There was some discussion as to international representatives on the Committee; by what name they should be called, whether International Corresponding Secretaries, Members of the Executive Committee, or by other terms.

DEAN JARDINE:

I move that the Secretary of this Congress obtain from the international representatives here in attendance the names, so far as possible, of suitable persons for membership on the Executive Committee; that the international representatives hereafter be known as members of the Executive Committee the same as the rest of us; and that the Chairman of this Committee be authorized to fill any vacancies.

This action was unanimously agreed to.

The new committee then proceeded to the election of a chairman.

Mr. Mantle of Saskatchewan moved the selection of W. I. Drummond of Oklahoma to be chairman for the year 1915, and referred to his untiring efforts during the year 1914.

Dean Jardine of Kansas seconded the nomination, and addressing the committeemen moved Mr. Drummond's unanimous election.

This was agreed to, and with some appropriate words, Chairman Drummond resumed the chair.

MR. DILLON:

I suggest, Mr. Chairman, that there be an early business session of the committee, or at any rate of the Board of Governors.

CHAIRMAN DRUMMOND:

That is the intention. I wish to explain again the manner of selection of the Board of Governors, which is, in reality, the executive committee of this Executive Committee. Under the constitution, the Chairman of the Executive Committee is empowered to appoint nine members, including himself, the President of the Congress, and the Executive Secretary-Treasurer, who shall comprise this Board of Governors and transact all necessary Congress business during the interim. Prior to the next Congress, or so often as it may see fit, this Board of Governors shall make report to the Executive Committee. The Chairman will reserve for the time being these appointments.

The Executive Committee then adjourned and the Congress resumed sessions, Vice-President Bainer in the chair.

CHAIRMAN BAINER:

What is the further pleasure of the Congress?

MR. DILLON:

I move you the Congress adjourn sine die.

The motion prevailed and the Tenth Congress was adjourned sine die.

THE CONSTITUTION AS REVISED AT WICHITA, 1914.

ARTICLE 1.—**Name**—The name of this organization shall be The International Dry-Farming Congress.

ARTICLE 2.—**Objects**—The objects of the Congress shall be: To encourage a better understanding of the principles of dry-farming and to cause the application of these principles in all regions where the annual precipitation is insufficient for the profitable production of crops under previously-known methods of agriculture, or where irregularity of rainfall results in severe drought during the growing season; to study practical agriculture and allied pursuits in such regions, and to collect and publish available data concerning the same; to urge closer relationship between the

farmer and the national and state agricultural departments; to create and maintain a cooperative educational propaganda in behalf of agricultural development; to ascertain and furnish when desired, actual facts concerning the agricultural possibilities of all territory embraced in the work of the organization; and to discourage and prevent, as far as possible, all dishonest exploitation of land projects; to prosecute at all times the study of crops, soils, climate, precipitation, evaporation, the effect of altitude, latitude and general conditions, upon farming operations, and to disseminate the information so obtained; to provide a clearinghouse for the advanced ideas and information gleaned by the various national and state experiment stations, and to cooperate with said stations to the utmost extent; to encourage individual effort in developing the safer system of agriculture which has been and is being evolved by this organization and its members, and by others engaged in like work.

ARTICLE 3.—Officers.—The officers of this Congress shall consist of the President, Honorary Vice-Presidents and three active Vice-Presidents.

There shall be an Executive Committeeman for each State and Territory in the United States and for each Nation and Province represented by membership in the International Dry-Farming Congress; a Secretary and a Treasurer or an Executive Secretary-Treasurer, as may be deemed advisable by the Board of Governors.

The Executive Committeemen shall be selected by the delegations representing the various States, Territories, Nations, and Provinces in the annual sessions of the Congress; and shall be submitted to the Committee on Nominations for report to the Congress. Vacancies may be filled by the Board of Governors either during or after the annual sessions of the Congress.

The Secretary and Treasurer, or Executive Secretary-Treasurer, shall be selected by the Board of Governors. The President and the Vice-Presidents shall be elected by viva voce vote or by ballot, a majority of the votes of all the members present being necessary to choice. Retiring Presidents of this Congress shall be ex-officio Honorary Vice-Presidents.

ARTICLE 4.—Executive Officers.—The Executive Committee shall elect its own Chairman. The Secretary of the Congress shall be the Secretary of the Executive Committee. The Treasurer may be required to furnish bond for the safe conduct of his office and shall make report to the proper officers or committee to be appointed by the Executive Committee at such times as may be designated. No indebtedness shall be incurred unless there shall be funds in the hands of the Treasurer to meet the same.

The Chairman of the Executive Committee shall designate a committee of nine, including the President of the Congress and the Secretary, which committee shall be known as the Board of Governors, and which board shall be empowered to transact all business of the Executive Committee during the interval between the annual sessions. The Chairman of the Executive Committee shall be the Chairman of the Board of Governors.

The Board of Governors shall meet at the call of the chairman. Any

three or more members of the Board of Governors may cause a meeting of the Board to be called at any time, upon reasonable notice, by joining in a signed request to the Chairman to issue such call. Five members of the Board of Governors shall constitute a quorum, one of whom may be a proxy.

During the interim between annual meetings, the Board of Governors shall have entire authority over all matters pertaining to the Congress, and may make and enforce such rules of procedure or bylaws as may be considered wise and expedient for the immediate conduct of the affairs of the Congress. The Board of Governors may delegate to the Chairman or to the Secretary of the Congress, such powers as it deems proper.

It shall be the duty of the Board of Governors to guard the welfare of the Congress in every particular; to use its best judgment and discretion in the making of contracts and the general business management. The Board shall do all in its power to preserve and increase the standing, dignity and prestige of the Congress, and to foster a policy of constructive growth.

The Executive Committeemen shall cooperate with the Secretary in establishing and enlarging the work of the Congress in their various States, Territories, Nations and Provinces; and the Secretary shall submit all plans for local work in each such state, territory, nation and province to the Executive Committeemen for approval. Vacancies in any committee or office may be filled by the Board of Governors.

ARTICLE 5.—Annual Meetings.—Annual sessions shall be held at such time and place as the Board of Governors shall designate.

An International Soil-Products Exposition may be held in connection with the annual sessions, under the direction and management of the Board of Governors, or the Board may contract with a representative organization of the city which is to entertain the Congress, whereby the latter shall conduct the Exposition, in conjunction with the Congress management.

ARTICLE 6.—Offices.—The offices or headquarters of the Congress shall be maintained throughout the year, in charge of the Secretary of the Congress, who shall have such assistance as is necessary in the discharge of his duties. As soon as the affairs of any Congress year are closed, the offices of the Congress shall then be moved to the city which is to entertain the next annual Congress sessions.

ARTICLE 7.—Board of Control.—The city which is to entertain the Congress next succeeding may organize a Board of Control or Committee, which Board shall represent the citizens of the state at large. The Board of Control may contract with the Board of Governors for the proper financing of such portion of the expenses of the Congress as may be agreed upon, and may arrange and furnish such quarters, facilities, etc., as shall be required, all upon an agreed basis.

ARTICLE 8.—Membership.—The annual membership dues shall be One Dollar, which shall entitle the member to participate in all sessions, and to receive each number of the monthly magazine. Official proceedings of the

annual sessions shall be printed, and furnished to members on request, at a price to be fixed by the Board of Governors. Life memberships shall be issued at \$20 each.

ARTICLE 9.—Official Magazine.—Under direction of the Board of Governors, there shall be published a monthly magazine known as "Dry-Farming and Rural Homes," which shall be the official organ of the International Dry-Farming Congress. The expense of publication shall be paid out of the general fund of the Congress, and all receipts from subscriptions or advertising shall be placed in the general fund.

ARTICLE 10.—Amendments.—This constitution may be amended by a two-thirds vote of the delegates assembled in any annual session of the Congress.

RESOLUTIONS, WICHITA, 1914.

The Ninth Sessions of this Congress reaffirm and reindorse the cardinal principles of the Congress as reiterated time and again since the organization of this useful body.

The Congress congratulates the world upon the progress made in scientific agriculture and the extension of dry-farming principles. It is a matter of great satisfaction that so many nations of the world should have brought such splendid reports to this Congress of the work in other countries.

The Congress extends its sincere appreciation to the countries and provinces of the world which have sent representatives to this international gathering; and congratulates those countries and provinces upon the splendid ability and personality of the men selected.

The Congress is deeply appreciative of the constructive work accomplished during the past year, resulting in these splendid sessions; and is not unmindful of the diligent work in that direction by the officers of the Congress.

Agricultural extension work having been urged by this Congress for years, it is a matter of sincere pleasure that the Smith-Lever bill in the United States has now become effective.

The work of county agents throughout the Southern part of the United States especially must have convinced every sincere advocate of agricultural development that this medium must be utilized constantly in the work of the future. It is hoped that state legislatures may rapidly fall into line and provide for these county agents.

The progress of irrigation in agriculture shall hereafter receive attention in the programs and sessions of this Congress.

The Congress extends its sincere thanks to the Kansas Board of Control for its effective organization work during the year; to the Governor of Kansas for his hearty sympathy and assistance at all times; to the Mayor, the citizens, and the commercial and civic bodies of Wichita for their hearty cooperation; to the newspapers and agricultural journals in Wichita and everywhere, even in foreign lands, for their readiness to assist in this great work; and to various associations, societies, and individuals who have contributed to the splendid success of this Congress.

DRY-FARMING: WHAT IT IS AND WHAT IT MEANS.

The following is the address delivered by W. M. Jardine, Dean of the Kansas Agricultural College and Director of Kansas Experiment Stations, and one of the founders of the International Dry-Farming Congress, at the formal Congress dinner given to distinguished visitors, guests and speakers of the Congress by the Kansas Board of Control at the Wichita Club, Wichita, Kansas, the night of October 15, 1914.

This address by Dean Jardine is one of the strongest definitions of dry-farming and the justification for the organization of the International Dry-Farming Congress and its results that has ever been uttered.

Its use and dissemination are most earnestly recommended:

"In the few moments I have to speak to you this evening, I feel that I cannot do better than to review briefly the history of the development of the International Dry-Farming Congress. Most of you assembled here, are attending for the first time the sessions of this institution, and are therefore unfamiliar with its origin and growth during the past ten years.

"There have been nine sessions held. The first call was issued by the Governor of Colorado in the winter of 1906. Delegates representing the Western States, that is, states west of the Missouri river, assembled in the Albany Hotel at Denver and there discussed this new system of dry-farming about which little was known at that time outside of Utah.

"It was decided to effect a permanent organization, to be known as the Transmissouri Dry-Farming Congress, and which was to hold annual sessions. The second meeting was held in Salt Lake City, in January, 1907, as I remember it; the third at Cheyenne, Wyoming; the fourth at Billings, Montana; the fifth at Spokane, Washington; the sixth at Colorado Springs, Colorado; the seventh at Lethbridge, Canada; the eighth at Tulsa, Oklahoma; and the ninth at Wichita.

"During the first three sessions the program consisted only of meetings at which papers were presented and discussions were held. The exposition became a feature of the Congress for the first time at the Billings session, since which time it has become a very important feature of the Congress.

"The Women's auxiliary came into being at Colorado Springs.

"The object of the Dry-Farming Congress was to perfect an organization which would serve as a clearing-house for all information relating to the subject of dry-farming and for the presentation of facts fundamental to its development. The annual sessions were to be participated in by farmers, investigators and businessmen alike, or anyone else interested in the real welfare and business of dry-farming. Its sessions were to be informal and conservative. Its policy from the beginning has been sound, and free from graft and the yellow journalism type of boosting. At different times men have appeared on the floor for the purpose of changing the name of the Congress. At times systematic and organized effort has been made to change the object and name of the Congress, in order that it might become more of an organization to boost the sale of Western lands and also the

prices. Every such attempt, however, has been defeated. The policies have been ruled by a body whose membership has been largely made up of farmers who were present to discuss better methods of dry-farming, rather than to boost the price of land and to set before the public unreliable information.

"It is because of this policy of giving out the facts only, that the Congress has been able to do so much good for dry-farming and for the West. Its meetings and its advice have been sought by prospective settlers, because it has come to be recognized as a reliable source of information. It has grown in the nine years of its life from an organization made up of members of three or four Western states, to an organization whose membership is now composed of men from practically every nation of the earth, and the term dry-farming is today as well if not better understood than any other term relating to the business of farming.

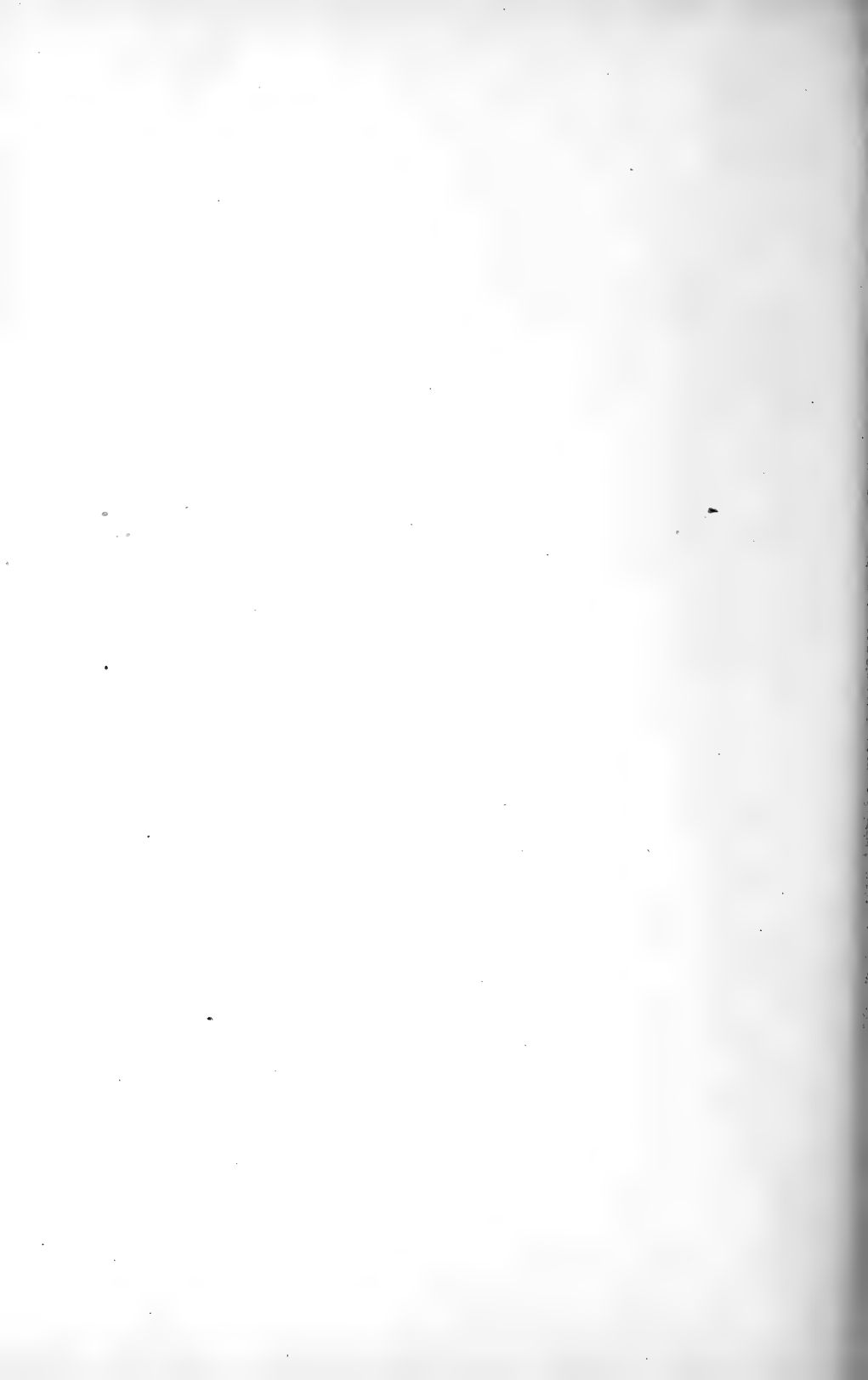
"Dry-farming is a term which originated in Utah, probably 50 years or more ago. It was used in speaking of farming without irrigation. All the farming in Utah is by irrigation or by dry-farming. Dry-farming is a term that was used in contradistinction to irrigation farming. The summer-fallow is fundamental to dry-farming. In fact, dry-farming is based upon summer-fallow. By means of the summer-fallow it is possible to store up water from one year to another for the production of a crop. Thus the summer-fallow took the place of irrigation; the only difference being that the summer-fallow stored the water from the heavens that came in the form of rain and snow, which was later used to supply the growing crop when drought was present, while the irrigator supplies the water from the streams.

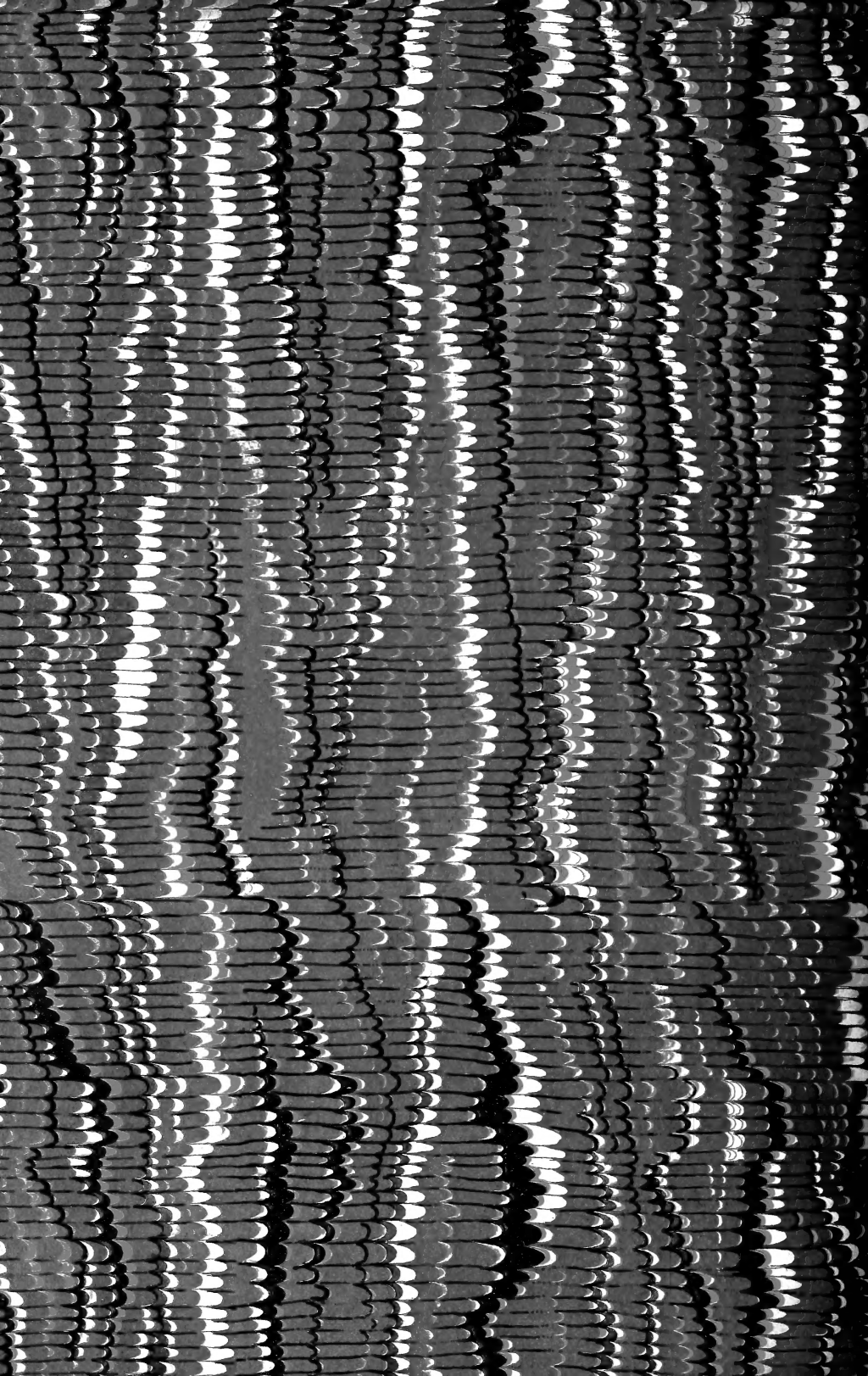
"Dry-farming as it is now understood had not been practiced by the farmers of Kansas, Oklahoma, and Nebraska to any extent until the last five years. It is only very recently that they are beginning to appreciate the necessity of farming their land in a manner that will insure the greatest possible utilization of the moisture available, a realization of which can only be brought about by practicing what is now understood as dry-farming methods. Farmers almost everywhere, whether in humid, sub-humid, or arid regions, are beginning to realize that the limiting factor in crop production, even where the annual rainfall is 60 inches or more, is lack of moisture at critical periods of the plant's development, owing to periodical droughts which almost always occur.

"So we find them using dry-farming methods in Maryland as well as in western Kansas, and in Russia as well as in the United States.

"It is the Dry-Farming Congress that is responsible for this world-wide understanding of the dry-farming system of growing crops.







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